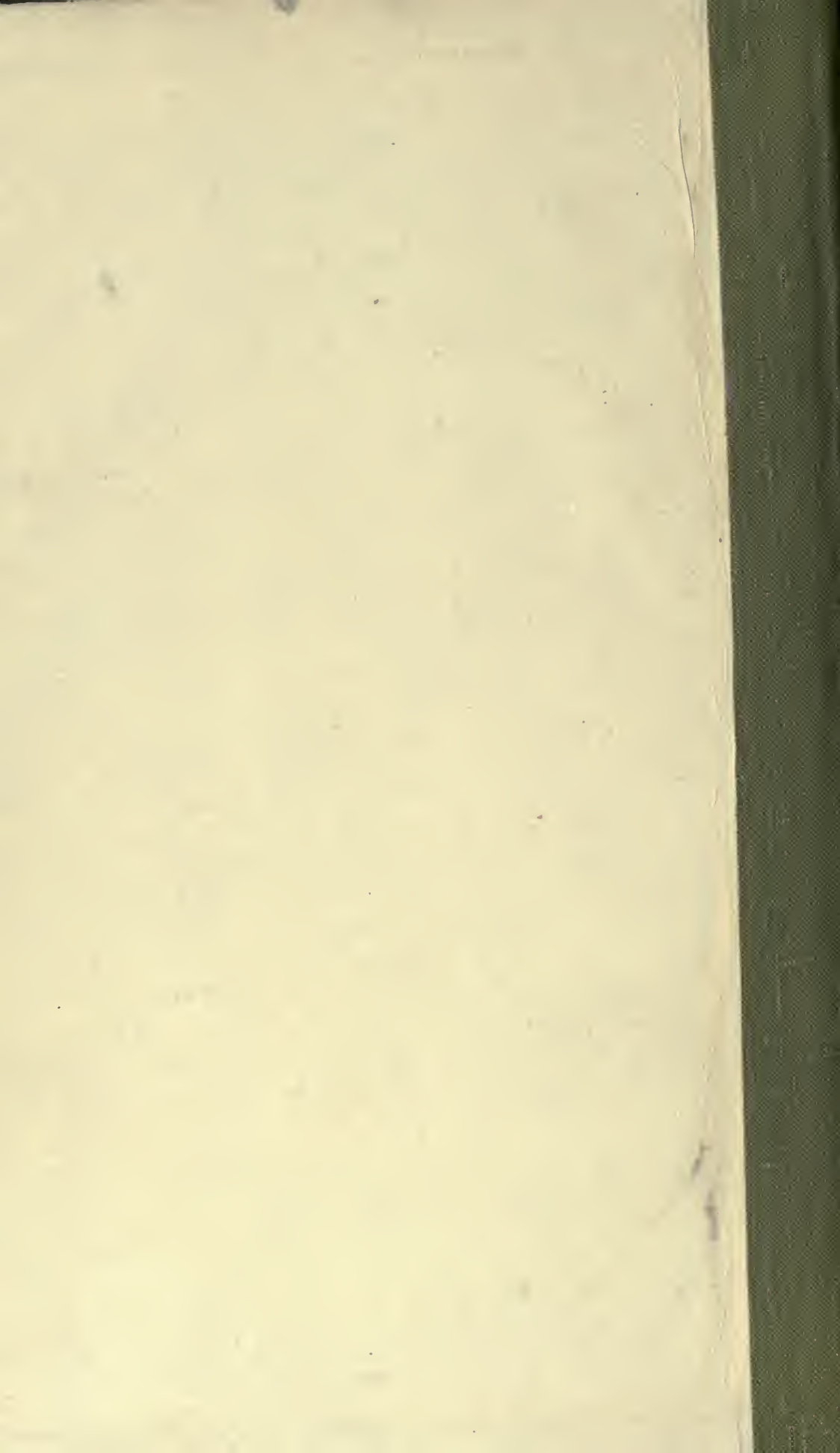


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AN ACCOUNT
OF THE
CRUSTACEA
OF
NORWAY

WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY

G. O. SÄRS

PROFESSOR OF ZOOLOGY AT THE UNIVERSITY OF CHRISTIANIA

VOL. VII

COPEPODA
SUPPLEMENT

WITH 76 AUTOTYPIC PLATES



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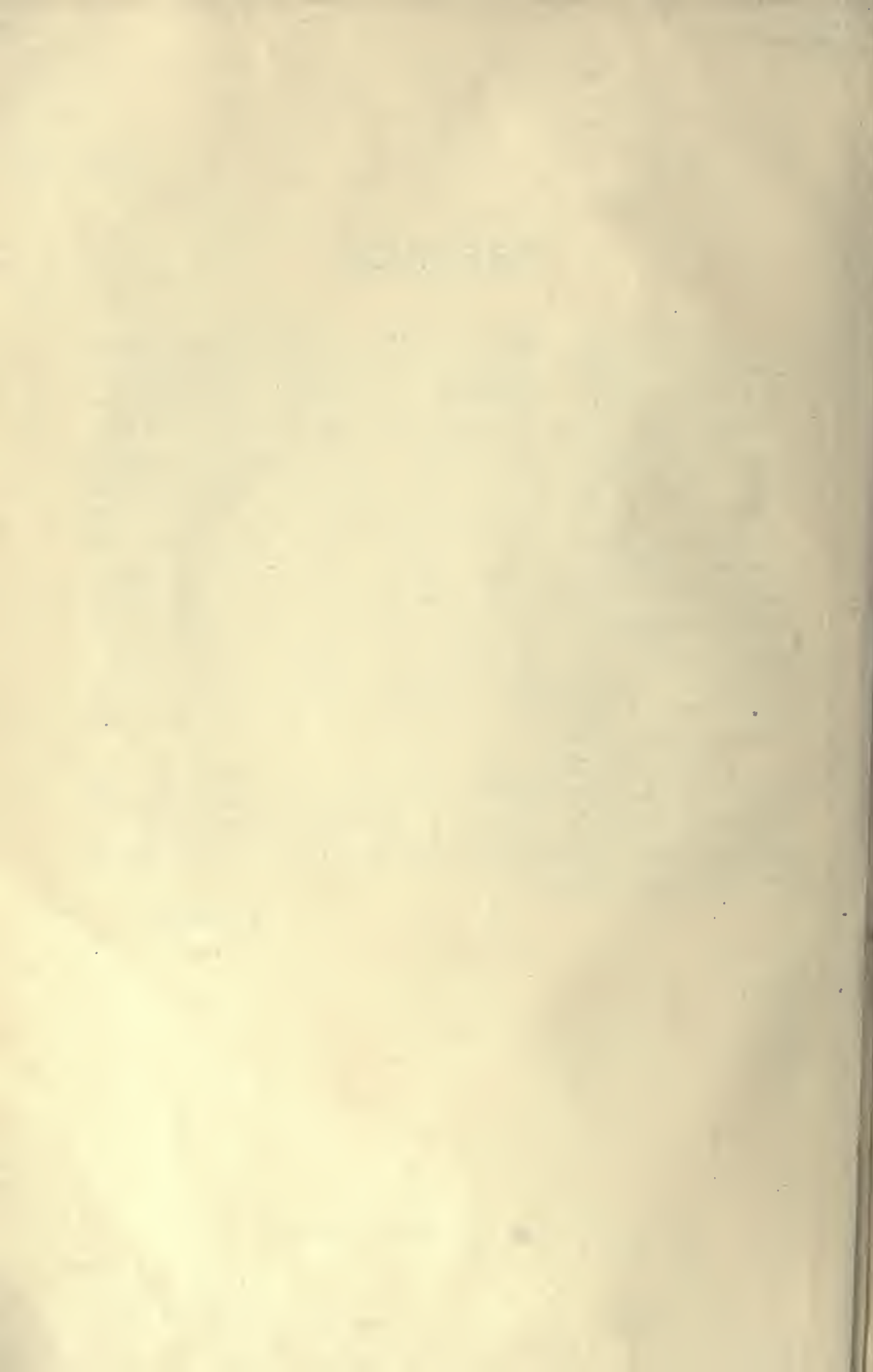
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PREFACE.

By the present Volume my Account of the 3 leading divisions of Copepoda, the *Calanoida*, *Harpacticoida* and *Cyclopoida* is finally concluded. Yet there still remains a considerable bulk of Copepoda of a more or less pronouncedly parasitic nature, the most familiar of which are the genuine Fish-parasites, the *Caligoida* and the *Lernæoida*. These 2 divisions have however recently been so carefully treated of in the excellent and beautifully illustrated work of Th. & A. Scott (British parasitic Copepoda), that a renewed account of these forms appears to be less needed. On the other hand, 2 other anomalous divisions of Copepoda, likewise in some measure parasitic in habits, but not included in the above mentioned work, viz., the *Monstrilloida* and the *Notodelphyoida*, may be more worthy of a careful reexamination. It is indeed my purpose in the next Volume now in preparation to give an exhaustive account of the Norwegian forms referable to these 2 interesting divisions, which in some respects show relations partly to the free-living Copepoda, partly to the true parasites.

I take the occasion again to express my most sincere thanks to the Direction of the Bergen Museum for the interest it has shown for my work and for the kindness in giving me an opportunity of still continuing it, in spite of the many obstacles which in these difficult times have arisen against the printing and publication.

G. O. Sars.



INTRODUCTION.

The considerable number of additional species observed during the latter years has induced me to publish a supplementary Volume to the *Copepoda*, containing descriptions and figures of these species, and embracing all the 3 leading divisions treated of in the 3 preceding Volumes. The far greater number of these species has been derived from the extensive division *Harpacticoida*; but also of *Calanoida* and *Cyclopoida* several interesting forms are added in the present Volume. Most of the species here described have been picket up from bottom-samples taken at different times, and chiefly in 2 localities on our southern coast, viz., Korshavn and Risør, some also from mixed collections of Copepoda made in the same localities. It is evident that the study of the present order of Crustacea still remains to be a very promising one, and I do not doubt that continued investigations in other places of our extensive coast will reveal many additional forms worthy of note.

Calanoida.

Fam. Phaënnidæ.

Gen. Xanthocalanus, Giesbr.

Remarks.—Of this genus, in addition to the 2 species originally recorded by Giesbrecht from the Mediterranean, several new forms have been described in recent time from the northern Ocean, some of them being, however, so nearly related, the ones to the others, that they, without a very close examination, may easily be confounded. As moreover, owing to the great brittleness of the appendages, most specimens obtained are more or less defective, the determination of the species belonging to the present genus is connected with no small difficulty. I have myself formerly, under the name *X. borealis*, confounded 3 different species. The one originally described by the present author under that name from the Nansen Expedition is a true arctic form, which does not occur off the coast of Norway. It has recently been identified, though with some doubt, by Mr. With with *X. hirtipes* Vanhoeffen. The Norwegian form recorded in Vol. IV of the present work as *X. borealis* is quite certainly not identical with the arctic species, differing, as it does, both by its much inferior size and by the rather unlike structure of the last pair of legs. I was seduced to this erroneous identification by the occurrence in my material of some few specimens, in which the last pair of legs, by the complete fusion of the 2 outer joints and the presence of only 3 apical spines, exhibited a certain resemblance to these appendages in the arctic form. These specimens I supposed to be young, not yet fully developed females, and that accordingly the last pair of legs changed their character according to age. This supposition has, however, turned out to be quite wrong. I have subsequently found fully adult specimens with the very same structure of the last pair of legs, and I have convinced myself that they are referable to a well defined species, which will be described below. For the other Norwegian species I propose the name

X. fallax. A 3rd Norwegian species has been described in the present work as *X. propinquus*. The most reliable character for distinguishing the species of the present genus is unquestionably the structure of the last pair of legs.

1. *Xanthocalanus minor*, Giesbr.

(Pl. I).

Xanthocalanus minor, Giesbrecht, Fauna und Flora des Golfes von Neapel: Pelagische Copepoden, p. 286 (footnote), Pl. 12, Fig. 32.

Specific Characters.—*Female*. Body moderately slender, with the anterior division oblong oval in form, greatest width not nearly attaining half the length and occurring somewhat behind the middle; dorsal face only slightly vaulted. Cephalosome nearly as long as the exposed part of the trunk, and exhibiting behind the middle dorsally a distinct transverse suture; anterior extremity narrowly rounded. Rostral filaments of moderate length and abruptly reflexed. Last trunkal segment completely coalesced with the preceding one; lateral lobes triangularly produced, and extending somewhat beyond the middle of the genital segment. Urosome comparatively short, scarcely exceeding in length $\frac{1}{4}$ of the anterior division; genital segment only slightly protuberant below, and about the length of the 2 succeeding segments combined; anal segment very small. Caudal rami scarcely longer than they are broad; apical setæ well developed and somewhat divergent, the innermost but one, as usual, considerably longer than the others. Anterior antennæ rather elongated, extending, when reflexed, to the end of the caudal rami. Posterior antennæ and oral parts almost exactly as in *X. fallax*. Natatory legs likewise of a very similar structure, though having the spinules of the inner ramus fewer in number. Last pair of legs, however, rather unlike those in the said species, the outer 2 joints being, as in *X. borealis*, completely coalesced to an elongated somewhat curved piece armed at the end with only 3 comparatively short, subequal spines, edges of the piece nearly smooth, with only a few cilia at the outer curvature.

Body in the living animal highly pellucid, with only a faint rosy pigment at the end of some of the segments.

Length of adult female reaching to 2.70 mm.

Remarks.—The figure given by Giesbrecht of the last pair of leg in his *X. minor* agrees pretty well with those appendages in the above-described form, and I think therefore that I am right in identifying both, though no other figures were given by Giesbrecht, nor any description of the species. The

length of the body is said to be only 1.20 mm.: but I suppose that an exact measurement may have been rendered difficult by the bad condition of the solitary specimen observed by that author.

As above stated, the present species was formerly confounded by me with *X. fallax* (at that time recorded as *X. borealis*), to which species it certainly bears a close resemblance. It is however rather inferior in size and of somewhat more slender form of body, differing moreover in the greater length of the anterior antennæ, and more particularly in the structure of the last pair of legs, which more resembles that in the arctic species, *X. borealis*. In the latter, however, these appendages are everywhere densely hirsute, and the apical spines are much stronger, nearly claw-like.

Occurrence.—Adult female specimens of the present species have been found in 3 different localities of the Norwegian coast, viz., at Risør, Stavanger, and in the upper part of the Trondhjem Fjord. In all 3 localities it occurred only occasionally and in comparatively shallow water.

Distribution.—Mediterranean (Giesbrecht).

Fam. Stephidæ.

Gen. Stephos, Scott.

Remarks.—Two well-defined species of this genus have been described in Vol. IV of the present work. A 3rd species is now added, to be described below.

2. *Stephos minor*, Scott.

(Pl. II).

Stephos minor. T. Scott, Tenth Ann. Report of the Fishery Board for Scotland, Part III, p. 245, Pl. VIII, figs. 1—13.

Specific Characters.—*Female*. Body resembling in shape that of *S. Scotti* G. O. Sars, the anterior division being regularly elliptical in outline and evenly vaulted dorsally; greatest width about half the length. Cephalic segment very large, with the front obtusely truncated and exhibiting no trace of rostral filaments. Lateral parts of last trunkal segment perfectly symmetrical and not

lamellarly expanded. Urosome equalling in length about $\frac{1}{3}$ of the anterior division; genital segment somewhat protuberant below, and about the length of the 2 succeeding segments combined. Caudal rami scarcely longer than they are broad; apical setæ rather slender, the innermost but one, as usual, the longest and considerably exceeding the length of the urosome. Anterior antennæ comparatively shorter than in *S. Scotti*, scarcely extending, when reflexed, beyond the genital segment. Posterior antennæ, oral parts and natatory legs of a structure very similar to that in *S. Scotti*. Last pair of legs rather small, with the distal joint conical in form, and only armed with a single denticle inside at some distance from the tip; outer edge with a small bristle opposite the denticle.

Male much smaller than female, with the urosome more slender and 5-articulate. Last pair of legs built on the same type as in the other species, though exhibiting well-marked specific differences, as seen from the figure here given.

Body in both sexes highly pellucid and without any obvious pigment. Length of adult female 0.73 mm., of male 0.60 mm.

Remarks.—The present species, first described by Scott, is nearly allied to *S. Scotti* G. O. Sars, but of much smaller size, and moreover well distinguished by the somewhat stouter anterior antennæ and by the structure of the last pair of legs in both sexes.

Occurrence.—Several specimens of this form were taken in a single place at Korshavn from a depth of about 15 fathoms. I have also found it occasionally at Risør in about the same depth.

Distribution.—Scottish coast (Scott).

Gen. *Parastephos*, G. O. Sars.

Remarks.—This genus was established in the year 1903 by the present author, to include a peculiar Copepod, of which at that time only a solitary male specimen was obtained. Subsequently Mr. Scott found also the female, and the perplexing characters distinguishing this sex fully prove the validity of the present genus. I have been fortunate enough to find a few female specimens off the Norwegian coast, and I am thus enabled to confirm the statements given by Scott about this sex.

3. *Parastephos pallidus*, G. O. Sars.

(Pl. III).

Parastephos pallidus. G. O. Sars, Account of the Crustacea of Norway, Vol. IV, p. 65, Pl. XLIV.

Specific Characters.—*Female*. Body very slender, with the two chief divisions sharply marked off from each other, the anterior one regularly oblong oval in form. Cephalic segment with a faint transverse suture behind the middle dorsally; front blunted, without any traces of rostral filaments. Last truncal segment completely fused with the preceding one, and having the lateral parts only slightly produced. Urosome very powerfully developed, equalling in length about $\frac{2}{3}$ of the anterior division, its 3 anterior segments expanded behind to elevated circular ridges densely clothed with delicate recurved spinules; genital segment scarcely at all protuberant below and, as usual, the largest, though not much exceeding in size the succeeding segment; anal segment well developed and of sub-cylindrical form; without any elevated ridge behind. Caudal rami scarcely longer than they are broad; apical setæ slightly divergent, the innermost but one on left ramus remarkably produced, being nearly twice as long as that on the right ramus. Anterior antennæ of the very same structure as in the male, and extending, when reflexed, to the end of the genital segment. Posterior antennæ and oral parts exactly as in the male. Natatory legs of quite normal structure and resembling those in the genus *Stephos*. Last pair of legs likewise built on the same type as in that genus, but of comparatively much larger size and pronouncedly asymmetrical, the left leg being considerably longer than the right; distal joint in both legs conically produced and armed outside with a row of 12—15 coarse denticles, the proximal of which is somewhat remote from the others and of larger size.

Body in the living animal semipellucid, of an uniform whitish grey colour, without any obvious pigmentation.

Length of adult female reaching to 2.20 mm.

Remarks.—Of this form, as above mentioned, only the male sex was formerly observed by me. The female, as usual, is of considerably larger size, and exhibits a most anomalous appearance by the powerful development and peculiar armature of the urosome. The last pair of leg are also remarkable by their comparatively large size, and more particularly by their conspicuous asymmetry, also observed by Scott. Another asymmetry, not mentioned by that author, is found in the extraordinary length of one of the caudal setæ on left side. On the other hand has the asymmetry described by the present

author in some of the natatory legs of the male specimen at first obtained proved to be quite accidental, as no such asymmetry was found in another male subsequently obtained.

Occurrence.—The originally described male specimen was taken at Skjerjehavn, outside the Sogn Fjord. I have subsequently obtained 3 additional specimens of this remarkable form, 2 adult females and one male. Of these the one female was taken at Kopervik, south west coast of Norway, the other female and the male specimen at Risør, the depth in both localities ranging from 50 to 100 fathoms.

Distribution.—Scottish coast (Scott).

Fam. Pseudocyclopiidæ.

Gen. Pseudocyclopia, Scott.

Remarks.—Only a single species of this genus, *P. stephoides* Thompson, has hitherto been recorded from the Norwegian coast. I am now enabled to add 2 other species, both described at an earlier date by British authors, and it is very probable that also the remaining 2 species, *P. minor* and *P. caudata* Scott, will on a further investigation be found to belong to the fauna of Norway.

4. *Pseudocyclopia Giesbrechti*, Wolfenden.

(Pl. IV, Pl. V, fig. 1).

Pseudocyclopia Giesbrechti, Wolfenden, Journal of the Marine Biological Association, Vol. VI, No. 3, p. 370, Pl. IV.

Specific Characters.—*Female*. Body rather short and stout, with the anterior division considerably vaulted above, and somewhat compressed, exhibiting in the dorsal aspect a narrow oblong form, with the greatest width scarcely attaining half the length. Cephalic segment very large and evenly curved in front; rostral prominence triangular, deflexed. Last truncal segment united with the preceding one and deeply emarginated behind in the middle, lateral parts obtusely rounded. Urosome about equalling in length $\frac{1}{3}$ of the anterior division; genital segment only slightly protuberant below and about the length of the 2 succeeding segments combined. Caudal rami short, being scarcely longer than they are broad, and somewhat obliquely truncated at the

end; apical setæ rather strong and partly exhibiting a dense annulation. Anterior antennæ only slightly exceeding half the length of the cephalic segment, and composed of 17 joints, the 1st of which, apparently formed by the junction of the 6 or 7 proximal joints, is very large, almost occupying half the length of the antenna. Posterior antennæ with the terminal part (inner ramus) comparatively shorter than in *P. stephoides*, though a little longer than the outer ramus; the latter 6-articulate, with the 2nd joint somewhat dilated, oval in form, and provided outside with 3 setæ, the 3 succeeding joints very small. Oral parts of the structure characteristic of the genus. Natatory legs likewise built on the same type as in the other species, though the rami appear somewhat more slender than in *P. stephoides* and more distinctly spinulose at the end of the joints, those of 4th pair being moreover densely covered with small prickles. Last pair of legs rather short and stout, with the last joint scarcely longer than the middle one and somewhat hand-shaped, terminating in 3 strong diverging digitiform spines of equal length, the outermost one distinctly defined at the base, whereas the other 2 form the immediate continuation of the joint; all 3 spines, as also partly the surface of the joint, coarsely spinulose.

Male, as usual, smaller than female and having the urosome more slender and distinctly 5-articulate. Antennæ, oral parts and natatory legs scarcely different from those parts in female. Last pair of legs, however, conspicuously transformed and very asymmetrical; right leg long and slender, terminating in a somewhat flexuous point; left leg much shorter, but with the 1st joint considerably tumefied, nearly globular in form, 2nd joint tapered distally and provided at the end with a well-marked rudiment of an appendicular ramus, 3rd joint very narrow and armed at the end with a slender movable claw, outside which are attached a bundle of 3 delicate and closely superposed lamellæ.

Colour of the living animal not yet ascertained.

Length of adult female reaching to 0.90 mm., that of male to 0.79 mm.

Remarks.—The present species was first described by Mr. Wolfenden from a solitary female specimen taken off the Shetland isles. Subsequently T. Scott found the same species also off the Scottish coast, and has given a figure with some details of a male specimen. It may easily be distinguished from *P. stephoides* by the comparatively shorter and stouter form of the body and more particularly by the structure of the last pair of legs in both sexes. As these appendages were somewhat damaged in the male specimen examined by Scott, the figure he gives of them has turned out to be rather imperfect. Moreover the right leg is described as the left, and vice versa.

Occurrence.—Several specimens of this form have been picked up from bottom-samples taken at Korshavn from a depth of about 60 fathoms muddy sand. It also occurs occasionally at Risør in about the same depth.

Distribution.—Shetland (Wolfenden); Scotch coast (Scott).

5. *Pseudocyclopia crassicornis*, Scott.

(Pl. V, fig. 2).

Pseudocyclopia crassicornis, T. Scott, Tenth Ann. Report of the Fishery Board for Scotland, Part III, p. 246, Pl. VII, figs. 15–29.

Specific Characters.—*Female.* Very like the preceding species, as to the general appearance of the body, but of much smaller size. Anterior antennæ comparatively shorter, scarcely exceeding half the length of the cephalic segment, and rather thick at the base, being composed of 16 joints, the 1st of which is very large, fully as long as the remaining part of the antenna, and, in addition to the usual short marginal setæ, provided with 3 comparatively large æsthetascs. Posterior antennæ with the penultimate joint (1st joint of the inner ramus) somewhat dilated in the middle, subfusiform in shape, outer ramus resembling in structure that of the preceding species and a little shorter than this joint. Oral parts and natatory legs of the usual structure. Last pair of legs with the middle joint very short, nearly circular in form; terminal joint much larger, occupying more than half the length of the leg, and armed at the somewhat obliquely truncated extremity with 3 slender spines, the innermost of which is much the longest and, like the middle one, not defined from the joint at the base. Spermatophore, attached to the genital segment, of unusually large size and curving upwards along the dorsal face of the urosome.

Male of still smaller size than female, and differing from it in a similar manner to that in the preceding species. Last pair of legs, however, of a somewhat simpler structure; the left leg having no trace of an appendicular ramus at the end of the 2nd joint, and only a single lamella outside the apical claw, which is rather small.

Colour in the living animal not yet ascertained.

Length of adult female scarcely exceeding 0.71 mm.; that of male 0.68 mm.

Remarks.—This form was described by T. Scott in the year 1892 as the type of his genus *Pseudocyclopia*. It is of much smaller size than the preceding species, and moreover easily distinguished by the shorter and thicker anterior antennæ and by the somewhat different structure of the last pair of legs in both sexes.

Occurrence.—I have found this form in the same localities and at about the same depth as the preceding species. At Risør only one or two specimens were obtained, whereas at Korshavn this form seems to be rather abundant in some places.

Distribution.—Scottish coast (Scott).

Fam. Platycopiidæ.

Gen. *Platycopia*, G. O. Sars, 1911.

Generic Characters.—General form of body resembling that of *Pseudocyclopia*. Last trunkal segment, however, well defined from the preceding one, and urosome composed in both sexes of only 4 segments. Anterior antennæ short and stout, though composed of rather a great number of articulations, and only slightly differing in the two sexes. Posterior antennæ with the outer ramus much larger than the inner. Oral parts considerably deviating in structure from the usual Calanoid type. Anterior lip narrowly produced at the end. Mandibles with the masticatory part only slightly expanded, palp comparatively slender, with the outer ramus larger than the inner. Maxillæ with the masticatory lobe very coarsely built, palp comparatively less fully developed than in most other Calanoida. Anterior maxillipeds cyclopoid in structure, the outer joints being armed with stout unguiform spines. Posterior maxillipeds more resembling those in other Calanoids. 1st pair of legs rather unlike the succeeding ones, with both rami imperfectly developed and without true spines; the remaining pairs very strongly built, with the rami broad and flattened, the outer one the larger, and having 2 successive spines outside the 1st joint; natatory setæ for the most part converted to short flattened spines. Last pair of legs built on the very same type as the preceding ones; those of male having the outer ramus slightly transformed and alike on both legs.

Remarks.—This genus was established by the present author in the year 1911, to include a remarkable deep-water Calanoid, *P. perplexa*, the closer examination of which revealed a most perplexing mixture of characters tending on the one side to the genus *Pseudocyclopia*, on the other side to *Pseudocyclops*, though these 2 genera, according to the definition given by Giesbrecht, in reality belong to 2 very different sections of the Calanoida, the

first to the *Amphascandria*, the 2nd to the *Heterarthrandria*. I think that this primary division of the Calanoida proposed by Giesbrecht, and now generally accepted by carcinologists, may turn out to be a less natural one, and I am also now in doubt about the validity of the 3rd intermediate section, *Isokelandria*, added in my earlier account of the Calanoida (Vol. IV of the present work). Indeed, it seems to be very difficult to decide, to which of these 3 sections the present genus should be referred.¹⁾ Two nearly allied species of this remarkable genus will be described below.

6. *Platycopia perplexa*, G. O. Sars.

(Pl. VI, Pl. VII, fig. 1).

Platycopia perplexa, G. O. Sars, Archiv f. Mathem. & Naturvidenskab, Vol. XXXI, No. 7, p. 4, Pl. I & II.

Specific Characters.—Female. Body short and stout, with the anterior division greatly vaulted above and somewhat compressed, the greatest width not fully attaining the height and about equalling half the length. Cephalic segment very large, occupying nearly half the length of the whole body, and evenly curved in front; inferior edges somewhat bulging in their anterior part, rostral projection comparatively short and acutely pointed at the end. The 4 succeeding segments densely crowded and of about equal length, though diminishing somewhat both in height and width; last segment deeply emarginated behind in the middle and having the lateral lobes rounded at the end. Urosome scarcely exceeding in length $\frac{1}{3}$ of the anterior division and narrow cylindrical in shape; genital segment comparatively small and only slightly dilated; penultimate segment the longest and produced at the end dorsally to 2 juxtaposed lanceolate lappets superposing the anal segment and apparently replacing the usual anal opercle; last segment much smaller than any of the others. Caudal rami short, being only slightly longer than they are broad; seta of outer edge small and attached somewhat in front of the middle; apical setæ rather unequal in length, the innermost but one being, as usual, the

¹⁾ At this occasion I will mention another instance, which still more seems to debilitate the validity of Giesbrecht's arrangement. On a closer investigation of the Calanoida from the Monaco Expedition instituted in the latter years, I have to my great astonishment found, that in the male of *Bathycalanus Richardi* G. O. Sars, a form unquestionably nearly allied to *Megacalanus*, the right anterior antenna is very distinctly hinged. According to this character the genus *Bathycalanus* should of course, if the primary division proposed by Giesbrecht is accepted, not only be wholly removed from the family *Calanidae* (in the restriction here adopted), but transferred to quite another section of the Calanoida, the *Heterarthrandria*, an arrangement which in reality would be absolutely unreasonable.

longest. Anterior antennæ scarcely exceeding half the length of the cephalic segment and gradually tapering distally, being composed of 23 well-defined joints, the 1st of which is much the largest, occupying in length about $\frac{1}{3}$ of the antenna, and provided anteriorly, at some distance from the end, with a peculiar strongly developed spiniform appendages curving outwards and terminating in a thin filament; the succeeding joints very short and clothed anteriorly with small bristles; terminal joint longer than the preceding ones and narrow linear in form. Posterior antennæ of an unusually compact structure, with the outer ramus much larger than the inner and 5-articulate, the first 2 joints considerably dilated. 1st pair of legs much smaller than the others, and having the basal part quite naked; both rami short, biarticulate, with the proximal joint small and unarmed, distal joint of outer ramus carrying 6, that of inner ramus 3 curved setæ. The 4 succeeding pairs of essentially equal structure and very coarsely built, though somewhat diminishing in size posteriorly; 2nd basal joint very large and obliquely truncated at the end, being provided outside near the end with a short spine, inside with a coarsely ciliated seta, which however is wanting on the last pair; both rami distinctly 3-articulate in all the pairs and rather unequal, the outer one being much the larger; number of spines and setæ slightly differing in the different pairs.

Male somewhat smaller than female, but very like it in the general outward appearance, though perhaps a little less robust. Anterior antennæ with the number of joints somewhat reduced, being only 16-articulate, and moreover differing in the much fuller development of the aesthetascs, the number of which is about 8. Last pair of legs with the outer ramus slightly transformed, being only composed of 2 joints, the distal one rather elongated and somewhat constricted in the middle, with the inner edge quite smooth, the outer armed with 2 rather distant spines, end of the joint transversely truncated and carrying a thin partly ciliated lamella flanked by 2 unequal spines, the outer one of normal appearance, the inner long, styliform and quite smooth.

Colour of the living animal not yet ascertained.

Length of adult female reaching 0.95 mm., that of male 0.83 mm.

Remarks.—This interesting Calanoid was described and figured by the present author in the above-quoted Journal as the type of a new genus and even of a new family. It is now redescribed and new improved figures given. The resemblance, as to the outward appearance, to the species of the genus *Pseudocyclopia* is rather striking, and may be accounted for as the result of

a convergent evolution caused by the adaptation to similar conditions of life. It is undoubtedly, like the species of the said genus, a true bottom-form.

Occurrence.—Some few specimens of this remarkable form were picked up from a bottom sample taken several years ago at Korshavn from a depth of about 60 fathoms, coarse muddy sand. I have not met with it in any other place of the Norwegian coast.

7. *Platycopia pygmæa*, G. O. Sars, n. sp.

(Pl. VII, fig. 2).

Specific Characters.—*Female.* General form of body resembling that of the preceding species, though comparatively less robust. Anterior division considerably compressed and, viewed dorsally narrow oblong in outline, with the greatest width scarcely exceeding $\frac{1}{3}$ of the length. Urosome very narrow and nearly attaining half the length of the anterior division. Caudal rami much more elongated than in the type species, being more than 3 times as long as they are broad; seta of outer edge attached near the base of the ramus. Antennæ, oral parts, and 1st pair of legs exhibiting a structure very similar to that in the type species. The 4 succeeding pairs of legs likewise built on the very same type, though differing in the imperfect segmentation of the inner ramus, its 2 outer joints being wholly coalesced in the 2nd pair and only slightly indicated in the 3 succeeding pairs.

Male differing from the female in a very similar manner to that found in the preceding species. Anterior antennæ, as in the male of *P. perplexa*, only composed of 16 joints, the outer 2 of which are rather elongated and narrow. Last pair of legs of a comparatively more compact structure than in the male of the preceding species, with both rami only composed of 2 joints, the outer one armed at the end of the broad, spatulate distal joint with 2 large, sabre-like spines, between which a thin hyaline lamella is attached.

Colour of the living animal not yet ascertained.

Length of adult female scarcely exceeding 0.60 mm.; that of male 0.52 mm.

Remarks.—The present form is nearly allied to the type species, but evidently specifically distinct, differing not only in its much inferior size, but also in some of the structural details, as pointed out in the above given diagnosis.

Occurrence.—Only 3 specimens of this form, one female and 2 males, have as yet come under my notice. They were found in a bottom-sample likewise taken at Korshavn, but from somewhat shallower water, viz., about 30 fathoms, muddy bottom.

Fam. Pseudocyclopidae.

Gen. Pseudocyclops, Brady.

Remarks.—Three species of this genus have as yet been recorded, one from the Mediterranean and 2 from the British coast. One of the latter, *P. obtusatus* Brady, is described in the 4th Volume of the present work, and I am now enabled to add to the fauna of Norway also the 2nd British species, to be described below.

8. *Pseudocyclops crassiremis*, Brady.

(Pl. VIII & IX).

Pseudocyclops crassiremis, Brady, Nat. Hist. Trans. Northumberland and Durham, Vol. IV, p. 431, Pl. XVII, figs. 1—8.

Specific Characters.—*Female.* Body rather robust, with the anterior division evenly vaulted above and somewhat compressed, seen dorsally, oblong oval in outline and nearly of equal width throughout. Cephalic segment very large, almost occupying half the length of the body, and obtusely rounded in front, exhibiting behind the middle a rather faintly marked transverse suture, inferior edges somewhat expanded in their anterior part. Rostrum very strong, deflexed, and acutely pointed at the tip. Last trunkal segment deeply emarginated behind in the middle and partly confluent with the preceding one, being only defined from it by a slight sinus of the inferior edges; lateral lobes broadly rounded at the end. Urosome not nearly attaining half the length of the anterior division; genital segment somewhat larger than the succeeding segment and slightly protuberant below; anal segment very small. Caudal rami scarcely longer than they are broad, and somewhat obliquely truncated at the end; apical setæ of moderate length. Anterior antennæ about half the length of the cephalic segment, and composed of 17 joints rather densely clothed with comparatively short curved setæ; 1st joint much the largest and rather broad, carrying, in addition to the setæ, 3 slender æsthetascs. Posterior antennæ and oral parts of essentially same structure as in *P. obtusatus*. Legs likewise rather similar; last pair, however, differing in the shorter and stouter form of the inner ramus, the joints of which, moreover, are almost wholly coalesced.

Male somewhat smaller than female and easily recognisable by the more slender and distinctly 5-articulate urosome. Rostrum, as in the male of

P. obtusatus, sharply defined at the base, and somewhat smaller than in female. Right anterior antenna conspicuously hinged, with the middle joints rather tumefied, terminal movable part only composed of 3 joints, the 1st of which is produced at the end anteriorly to a slender spiniform process. Last pair of legs exceedingly strong and massive, being built on a similar type to that in the male *P. obtusatus*, though exhibiting some minor differences, as seen from the figure here given.

Body in the living animal highly pellucid and nearly colourless; eye very conspicuous and of a light red colour.

Length of adult female amounting to 0.86 mm., that of male to 0.80 mm.

Remarks.—This form was first described by Prof. Brady in the above quoted journal, and was subsequently briefly recorded by the same author in his well-known Monograph of British Copepoda. It is nearly allied to *P. obtusatus*, but of somewhat larger size and more robust form of body, differing moreover in some of the anatomical details, as pointed out in the above diagnosis.

Occurrence.—I have only met with this form in a single locality of the Norwegian coast, viz., at Korshavn, where some few specimens were taken from a depth of about 30 fathoms, muddy bottom.

Distribution.—British Isles (Brady).

Fam. Acartiidæ.

Gen. *Paracartia*, Scott, 1894.

Generic Characters.—General appearance somewhat resembling that of *Acartia*; sexual differences, however, much more conspicuously marked. Last trunkal segment in both sexes wholly coalesced with the preceding segment, and in female expanded on each side to a broad wing-like lappet; in male simple, not expanded. Urosome in female short, and composed of only 3 segments, the 1st of which (the genital segment) is much the largest and lamellarly expanded laterally; caudal rami broad, with one of the apical setæ converted to a strong spine. Urosome of male slender and composed of 4 well-defined segments, the 1st of which is rather small; none of the caudal

setæ spiniform. Front in both sexes provided with 2 slender*recurved filaments. Anterior antennæ in female resembling in structure those in *Acartia*; right antenna in male conspicuously transformed and strongly hinged. Posterior antennæ, oral parts, and natatory legs nearly as in *Acartia*. Last pair of legs in female comparatively large and confluent at the base, terminal joint claw-like; those in male powerfully developed and very asymmetrical; right leg much the larger and terminating in a slender incurved claw. Spermatophore affixed to the genital segment of the female, accompanied by a thin plate folding upwards on each side of the segment.

Remarks.—The name *Paracartia* was proposed in 1894 by Scott merely to designate a sub-genus of *Acartia*. I think, however, that the differences are great enough to warrant this sub-genus to be raised to a true genus associated with *Acartia* in the family *Acartiidae*, as defined by the present author (see Vol. IV, p. 147). Scott records 2 supposed species of this genus, both found together in a plankton-sample taken in the bay of Guinea; but, as suggested by Giesbrecht, there can be no doubt that *P. spinicaudata* is the female and *P. dubia* the male of one and the same species, to which the latter name has been assigned by Giesbrecht. The *Acartia lalisetosa* of Kriczagin (= *A. verrucosa* Thompson) is apparently referable to the present genus, though differing in some particulars conspicuously from the species observed by Scott. On the other hand, is the Norwegian form described below very closely allied to that species.

9. *Paracartia Grani*, G. O. Sars.

(Pl. X & XI).

Paracartia Grani, G. O. Sars, Bergens Museums Aarbog 1904, No. 4, p. 3, Pl. I—IV.

Specific Characters.—*Female.* Body comparatively slender, with the anterior division gradually narrowed in front. Wing-like expansions of last trunkal segment very large, triangular, each terminating in an acute point. Urosome scarcely exceeding in length $\frac{1}{4}$ of the anterior division, and somewhat constricted in the middle; genital segment fully twice as broad as it is long, forming on each side a lamellar expansion obliquely truncated at the end. Caudal rami conspicuously asymmetrical, the right ramus being considerably broader than the left; marginal setæ comparatively short, 2 of them attached to the outer edge; middle apical seta on both rami spiniform, that on right ramus much stronger than that on left. Anterior antennæ not fully attaining the length of the anterior division of the body, and apparently composed of 17 or 18 joints, some of the proximal ones being however less distinctly

defined. Last pair of legs comparatively strongly built, with the proximal parts completely coalesced in the middle, terminal parts claw-like and coarsely denticulated in their outer part, that on right side conspicuously larger than that on left side.

Male of somewhat smaller size than female and very unlike it in its outward appearance. Anterior division regularly oblong oval in outline, with the last segment quite simple, without any lateral expansions. Urosome much more slender and narrow, cylindrical in form, with the 2nd segment the largest. Caudal rami comparatively small and quite symmetrical, marginal setæ quite normally developed, none of them being spiniform. Right anterior antenna very strongly hinged and somewhat resembling in structure that in male *Pontellidæ*; proximal part of the middle section considerably tumefied and composed of 4 firmly connected joints, distal part of that section formed by a single elongated and highly chitinised joint movably articulated both with the proximal part and with the succeeding terminal section; the latter composed of 4 joints, the 1st of which is the largest and armed in front with a long, dark-coloured claw-like spine. Last pair of legs powerfully developed and very asymmetrical, the right leg being more than twice as long as the left and exhibiting inside 2 differently shaped lappets, apical claw very slender and abruptly curved inwards; left leg provided at the end with 2 peculiar appendages, the outer one somewhat lamellar and densely ciliated outside, the inner terminating in a styliform point.

Colour of the living animal not yet ascertained.

Length of adult female only slightly exceeding 1 mm.; that of male about the same.

Remarks.—This form has been fully described and figured by the present author in the above-quoted journal, and its close relationship to the tropical species recorded by Scott pointed out. Indeed, after having had the opportunity of examining some specimens of the latter species kindly sent to me from Scott, I am now much inclined to regard it as merely a somewhat depauperated form of that species left behind from a far remote period, in which a considerably warmer climate and a more southern fauna prevailed in our country.

Occurrence.—The present interesting form was found by Prof. H. Gran very abundantly in an oyster-bed (Espevigpollen) located at Tysnes, south of Bergen. It also occurred, though more sparingly, in another neighbouring bed (Seløpollen). In both these beds the water holds during the summer a very high and uniform temperature amounting to no less than + 30° C., and also

in winter the temperature is comparatively high (up to $+10^{\circ}\text{C.}$). It is evident, that by this exceptional temperature, in connection perhaps with the chemical constitution of the water, quite particular conditions of life are created, which may have favoured the continued existence of the present southern form in the above mentioned isolated basins.

Harpacticoida.

Fam. Longipediidæ.

Gen. *Sunaristes*, Hesse.

10. *Sunaristes paguri*, Hesse.

(Pl. XII).

See Vol. V, p. 15, Pl. VI & VII.

Specific Characters.—*Male.* Body still more slender than in female, with no sharp demarcation between the two chief divisions, the posterior segments of the trunk being scarcely wider than those of the urosome and of simple cylindrical form, without any distinct epimeral plates. Urosome composed of 5 well defined segments, the 1st of which (the genital segment) is only slightly larger than the succeeding one, and somewhat protuberant at the end below; last segment, as in the female, much smaller than the others. Caudal rami of same appearance as in the female. Anterior antennæ very strongly built, and pronouncedly subcheliform, each terminating in a powerfully developed hand, with a well-marked projecting angle in front defining the palmar edge, against which the clawshaped terminal joint, or dactylus, admits of being impinged. Posterior antennæ and oral parts exactly as in the female. Natatory legs likewise very similar, with the exception of the 2nd pair, the inner ramus of which is conspicuously transformed, its 1st joint being produced at the end outside to a very strong mucroniform process extending beyond the middle of the terminal joint. Last pair of legs still more rudimentary than in female, all the setæ arising immediately from the corresponding segment, without any intervening lamella. Genital lobes closely approximate and of obtusely triangular form, each carrying outside near the end a slender seta.

Length of the specimen examined 2.15 mm.

Remarks.—Of this peculiar Copepod only the female sex was described in Vol. V. I now add the above short diagnosis of the male, and on Pl. XII

give figures of the whole animal in dorsal and lateral aspects, and of some of the appendages more highly magnified.

Occurrence.—The male specimen here described was kindly sent to me from Dr. Jules Richard. I have myself not met with this Copepod since I observed the solitary female specimen described in Vol. V and taken at Hvalør, outside the Christiania Fjord.

Fam. Cerviniidæ.

Gen. *Cerviniopsis*, G. O. Sars.

11. *Cerviniopsis clavicornis*, G. O. Sars.

(Pl. XIII, fig. 1).

Cfr. Vol. V, p. 22, Pl. XII, Pl. XIII, fig. 1.

Specific Characters.—*Male.* General form of body closely resembling that of female. Rostral plate, however, comparatively larger and more prominent, and the 2 anterior caudal segment more sharply marked off from each other. Anterior antennæ only slightly transformed, and scarcely at all prehensile, being apparently composed of 8 joints, the outer 4 of which, however, are less perfectly defined and together form a thinner terminal part bent backwards at an angle to the proximal part; 2nd, 3rd, 4th and 6th joints each with a well-developed æsthetask; last joint very small and armed at the tip with a minute claw-like spine accompanied by some unequal setæ. Posterior antennæ, oral parts, and natatory legs exactly as in the female. Last pair of legs, however, conspicuously transformed, each leg being composed of 3 well-defined joints, the 1st of which, as in female, is quite short and produced outside to a digitiform process carrying a slender seta; middle joint armed at the end outside with a slender spine and about of same size as the terminal one, which carries 5 spines, one outside, 2 inside and 2 on the tip. Genital lobes rather remote, the one from the other, and of very small size, knob-like, each lobe carrying on the tip 2 slender setæ.

Length of the specimen examined 1.13 mm.

Remarks.—Of this form also only the female sex has been described in Vol. V. The male, of which I now am enabled to give a diagnosis, is so very like the female in its outward appearance, that it easily may escape

attention. It is however of somewhat inferior size and moreover, on a closer examination, exhibits some well-marked sexual differences, especially as regards the structure of the anterior antennæ and the last pair of legs. The imperfect prehensile nature of the former appendages is very remarkable.

Occurrence.—The present peculiar Copepod was formerly only known from the Lofoten islands. I have in the latter years taken it rather abundantly at Risør, South coast of Norway, in depths ranging from 60 to 100 fathoms, muddy bottom. Among the numerous specimens collected only very few males were detected.

Gen. *Zosime*, Boeck.

Remarks.—Two well defined species of this genus, *Z. typica* Boeck and *Z. incrassata* G. O. Sars, have been described in Vol. V. In the present Volume 2 other species are added, both of which are closely allied to the typical one, though apparently distinct.

12. *Zosime major*, G. O. Sars, n. sp.

(Pl. XIII, fig. 2).

Specific Characters.—*Female.* Very like *Z. typica* in its outward appearance, but of considerably larger size and comparatively more slender form of body. Anterior segments of urosome, as in that species, expanded laterally to triangular recurved lamellæ finely spinulose at the edges; penultimate segment simple, cylindrical in form, and armed along the hind edge dorsally with a dense and regular row of rather coarse denticles. Caudal rami rather produced, being fully 3 times as long as they are broad, and somewhat constricted at the base; anterior half of the outer edge finely spinulose, seta of same edge of moderate size and attached near the end of the ramus; apical setæ only 3 in number on each ramus, that usually attached to the outer corner being wholly absent; innermost seta comparatively small, the other 2 rather strong and clothed in their outer part with small prickles instead of the usual cilia. Antennæ, oral parts, and natatory legs of a structure very similar to that in the type species. Last pair of legs, however, differing in the much larger size of the inner expansion of the proximal joint, which is broadly rounded at the end and provided with 4 strong marginal setæ; distal joint comparatively small, but well defined at the base.

Colour whitish grey.

Length of adult female amounting to 0.70 mm.

Remarks.—The present species is closely allied to the typical one, but of considerably larger size and somewhat more slender form of body, differing moreover conspicuously in the more produced caudal rami and in the structure of the last pair of legs. It is very probable, that the form recorded by British authors as *Z. typica* Boeck is more properly referable to the present species.

Occurrence.—I have met with this form occasionally in 2 different localities on the southern coast of Norway, viz., at Korshavn and Risør. It occurred in both places together with the typical species in depths ranging from 20 to 50 fathoms, muddy bottom. Only female specimens have as yet come under my notice.

Distribution.—? British Isles (Brady & Scott).

13. *Zosime valida*, G. O. Sars, n. sp.

(Pl. XIV).

Specific Characters.—*Female.* Body of a more robust and compact form than in the preceding species, with the 2 chief divisions less sharply marked off from each other and nearly of equal length. Rostral plate rather prominent and sub-triangular in form, tip narrowly truncated and carrying the 2 usual sensory hairs. Lateral lobes of the anterior caudal segments far less prominent than in the preceding species; penultimate segment, as in that species, armed along the hind edge dorsally with a row of denticles, which however are much stronger and of a somewhat flattened form. Caudal rami comparatively broad, sub-lamellar, the greatest width considerably exceeding half the length; seta of outer edge remarkably strong and attached to a sharply defined ledge somewhat remote from the end; apical setæ present in the usual number, that of the outer corner longer than that of the inner; the 2 middle setæ well developed and of quite normal appearance. Anterior antennæ apparently composed of 7 joints densely clothed with setæ, most of which are coarsely ciliated. Posterior antennæ, oral parts, and natatory legs exhibiting the structure characteristic of the genus. Last pair of legs with the distal joint wholly confluent with the proximal one; inner expansion of the latter comparatively small, and only provided with 2 slender setæ, both issuing from the narrowly truncated tip.

Colour whitish grey.

Length of the specimen examined 0.70 mm.

Remarks.—This form also is closely allied to the type species, though easily distinguishable both from it and from the preceding species by the comparatively more compact form of the body, and more particularly by the structure of the caudal rami and of the last pair of legs.

Occurrence.—Only a solitary female specimen of this form has hitherto come under my notice. It was taken last summer at Hvalør, outside the Christiania Fjord, from a depth of about 20 fathoms, muddy bottom.

Fam. Ectinosomidæ.

Gen. Ectinosoma, Boeck.

Remarks.—This genus seems to be exceedingly rich in species. To the 13 species described in Vol. V I am now enabled to add 8 more, the number of Norwegian species thus arising to no less than 21 in all. The determination of these species is, however, in some cases not easy on account of the rather uniform outward appearance of the body, and the anatomical examination is moreover rendered rather difficult by the glossy and tough integuments and by the smallness and fragility of some of the appendages. The most reliable distinguishing character is derived from the structure of the last pair of legs, which is perfectly constant and in nearly every case exhibits some peculiarity characteristic of the species.

14. *Ectinosoma proximum*, G. O. Sars, n. sp. (Pl. XV, fig. 1).

Specific Characters.—*Female.* Very like *E. neglectum* G. O. Sars, as to the general form of the body, but of somewhat smaller size. Rostral plate slightly prominent and, as seen dorsally, obtusely truncated at the end. Uro-some somewhat shorter than the anterior division and gradually tapered behind; anal segment scarcely more than half as long as the preceding segment and deeply incised behind in the middle. Caudal rami somewhat divergent, and almost twice as long as they are broad at the base; apical setæ of moderate length. Anterior antennæ comparatively rather short and stout, being apparently only composed of 5 joints densely clothed with strong curved setæ. Posterior antennæ, oral parts, and natatory legs exhibiting a structure very similar to

that in *E. neglectum*. Last pair of legs, however, differing conspicuously in the shape of the distal joint, the outermost lobe of which is narrow digitiform and defined from the remaining part of the joint by a deep and narrow incision extending almost to the base of the joint; inner expansion of proximal joint comparatively shorter than in *E. neglectum*, extending scarcely beyond the middle of the distal one; marginal setæ of both joints coarsely ciliated and rather unequal in length, that issuing from the middle lobe of the distal joint being the longest and extending about to the end of the genital segment.

Colour of the living animal not yet ascertained.

Length of adult female scarcely exceeding 1 mm.

Remarks.—The outward appearance of the present form looks so very like that of *E. neglectum* G. O. Sars, that at first I was inclined to regard it as merely an accidental variety of that species. Having however subsequently obtained several specimens of this form from widely distant localities, and in all of them found the very same characteristic structure of the last pair of legs, I am now of opinion that it more properly ought to be regarded as specifically distinct.

Occurrence.—I have found this form in 2 widely distant localities on the Norwegian coast, viz., at Bejan, outside the Trondhjem Fjord, and at Risør, in depths ranging from 20 to 50 fathoms. All the specimens obtained were of the female sex.

15. *Ectinosoma angulifrons*, G. O. Sars, n. sp.

(Pl. XV, fig. 2).

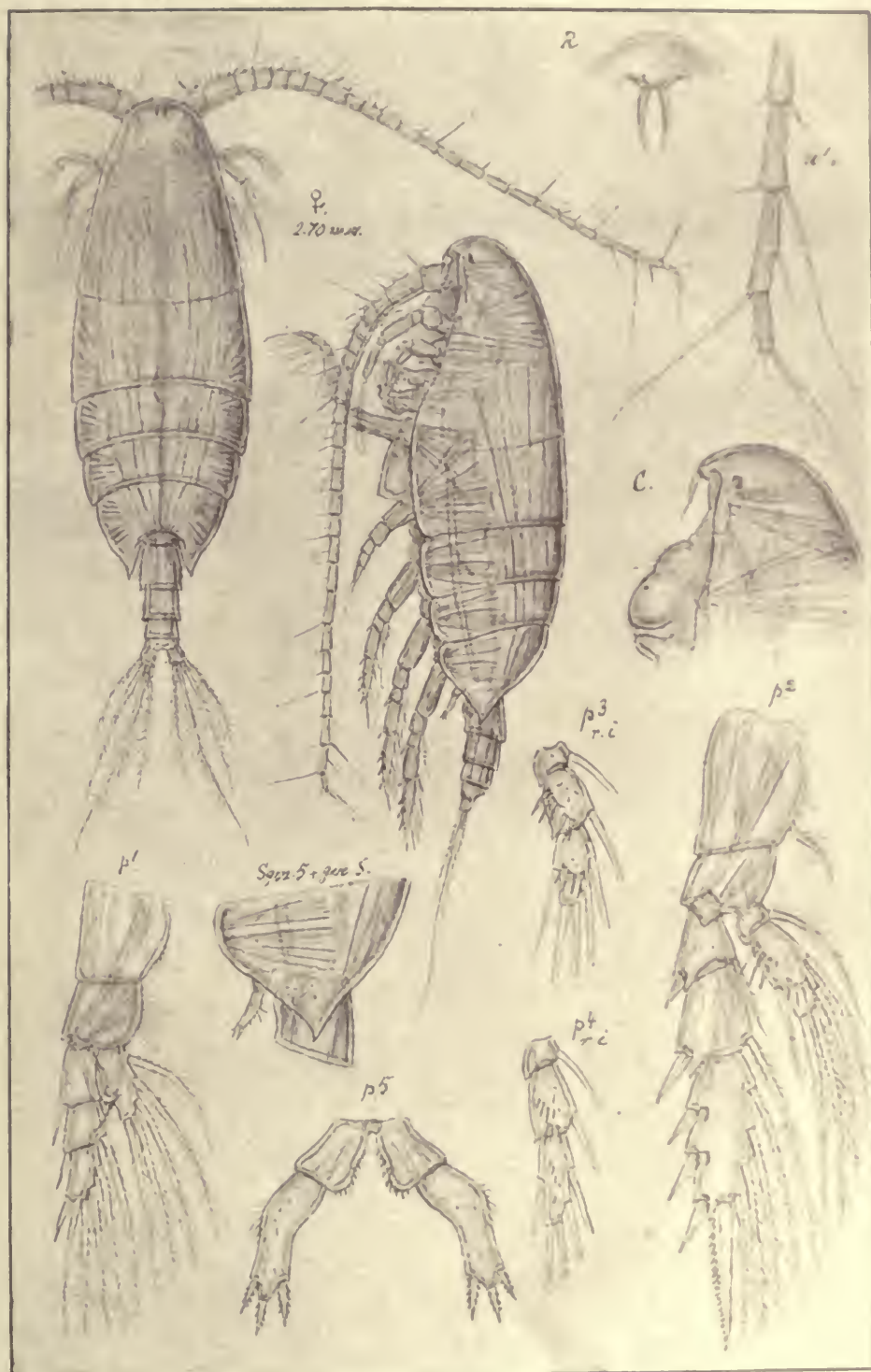
Specific Characters.—*Female.* Body comparatively slender, with the anterior division only slightly dilated. Rostral plate not much prominent and, as seen from above, terminating in an acute angle. Urosome much shorter than the anterior division and only slightly tapered behind; anal segment scarcely exceeding half the length of the preceding segment, and slightly incised behind in the middle. Caudal rami small, about as long as they are broad, and somewhat divergent; apical setæ of moderate length. Anterior antennæ resembling in structure those in the preceding species, though comparatively a little more slender. 1st pair of legs with the inner ramus, as usual, much larger than the outer, which scarcely extends beyond the middle joint of the former. Last pair of legs resembling in structure those in *E. propinquum* Scott, the distal joint being subquadrangular in form and somewhat unequally trilobed at the end; inner expansion extending beyond the middle

Copepoda

Phaënnidæ

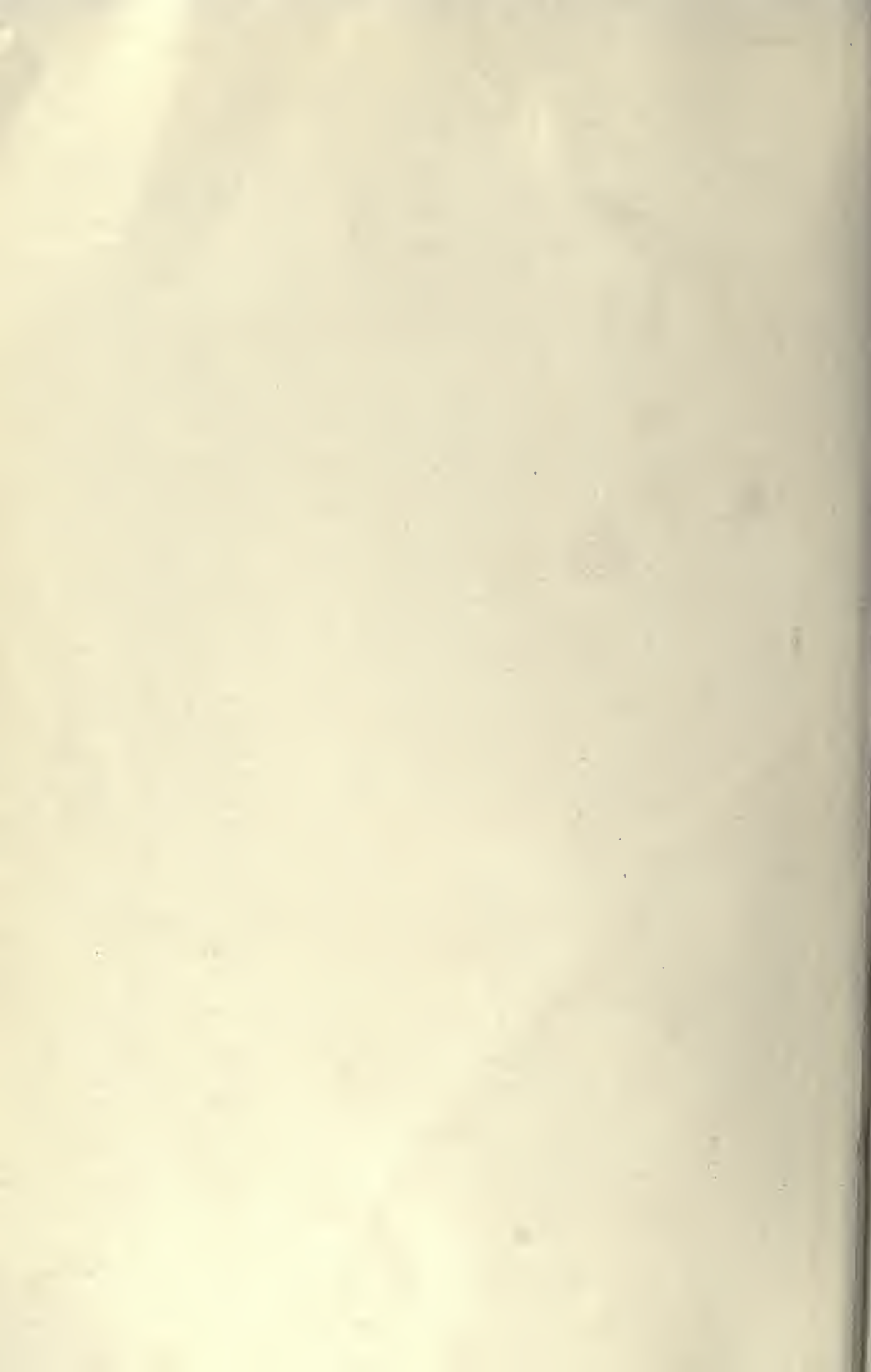
Suppl. Volume

Pl. I



G. O. Sars, del.

Xanthocalanus minor, Giesbrecht.

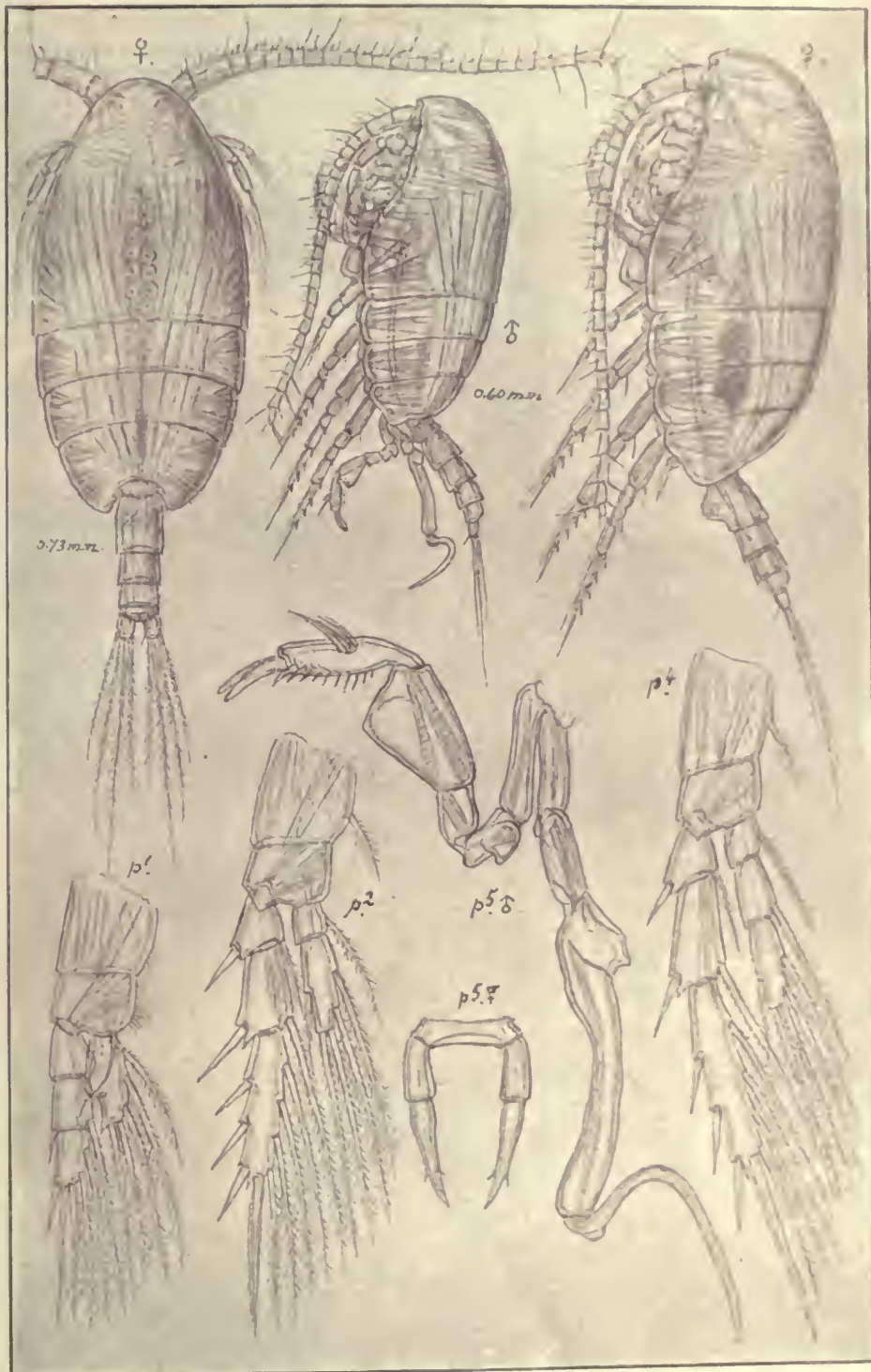


Copepoda

Suppl. Volume

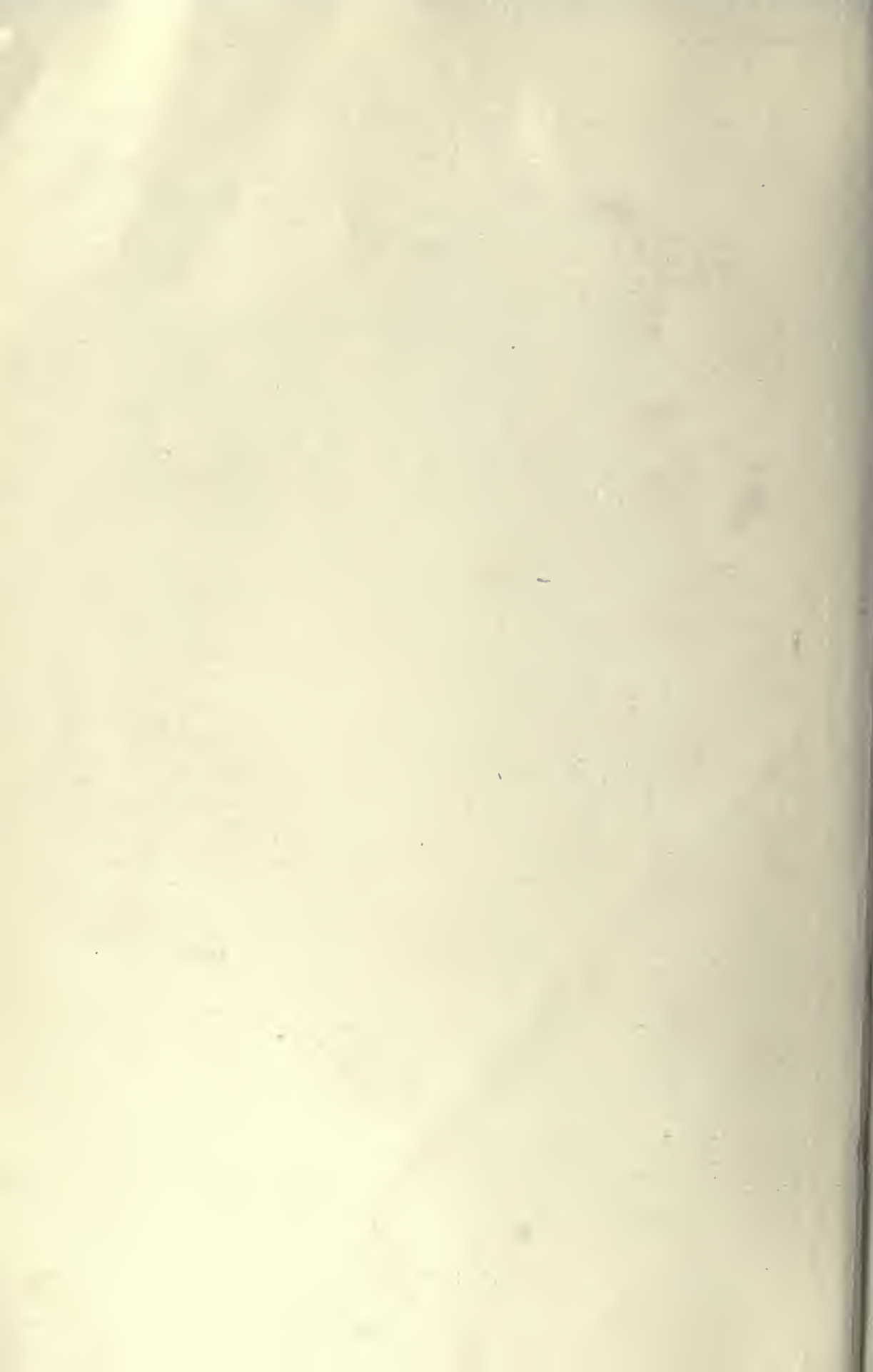
Stephidæ

Pl. II



G. O. Sars, del.

Stephos minor, Scott

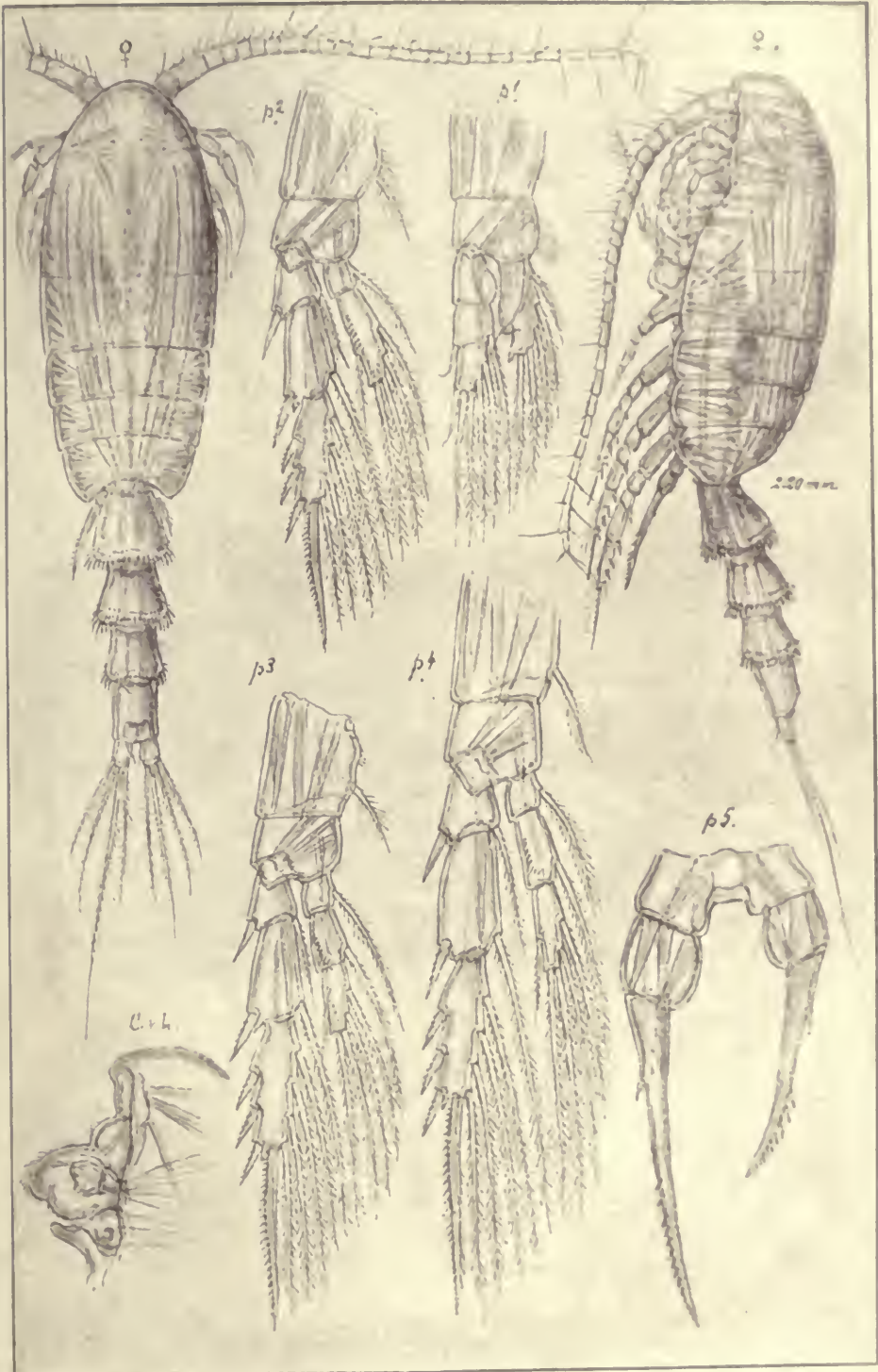


Copepoda

Suppl. Volume

Stephidæ

Pl. III



G. O. Sars, del.

Parastephos pallidus, G. O. Sars

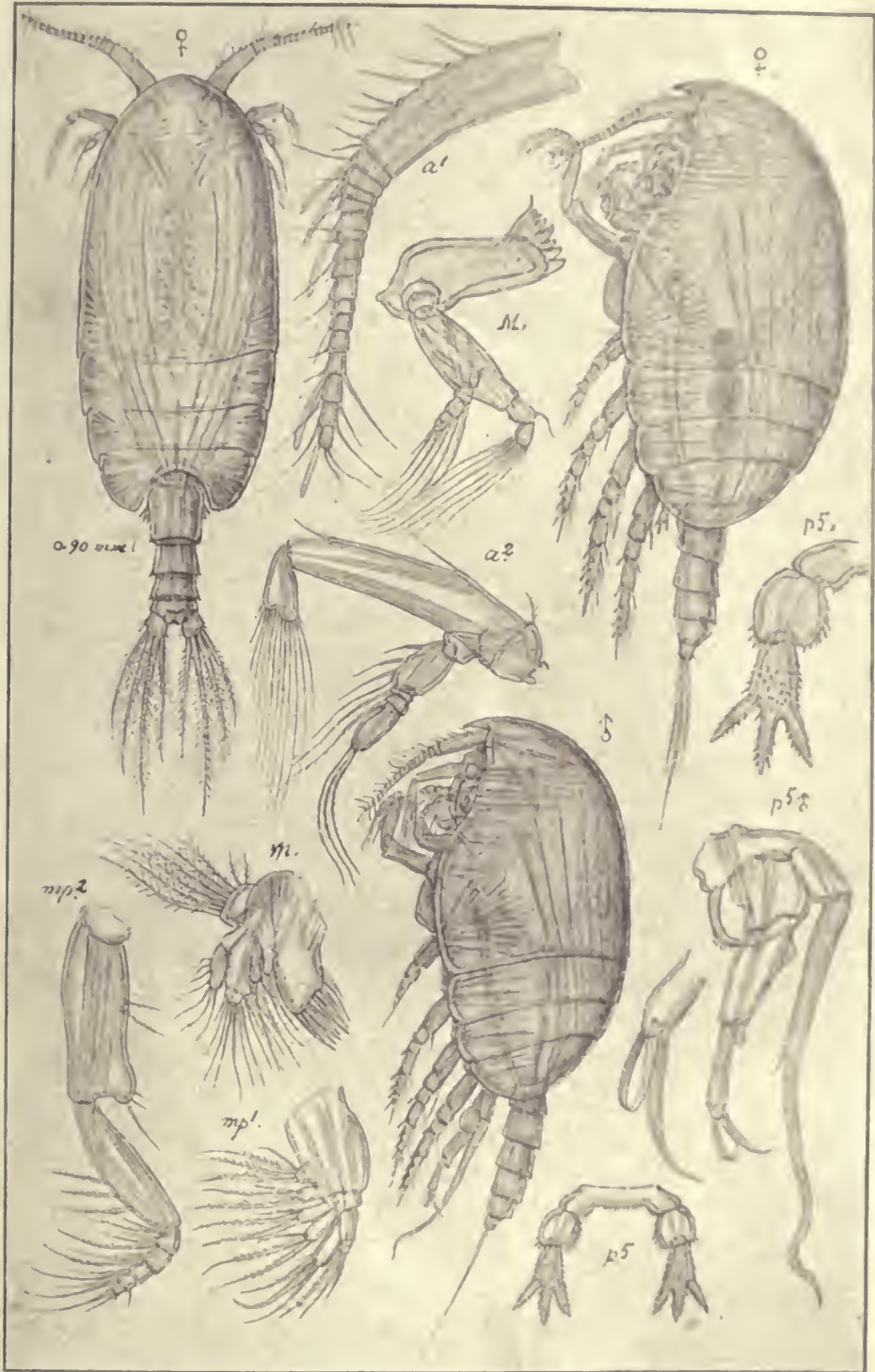


Copepoda

Pseudocycloplidæ

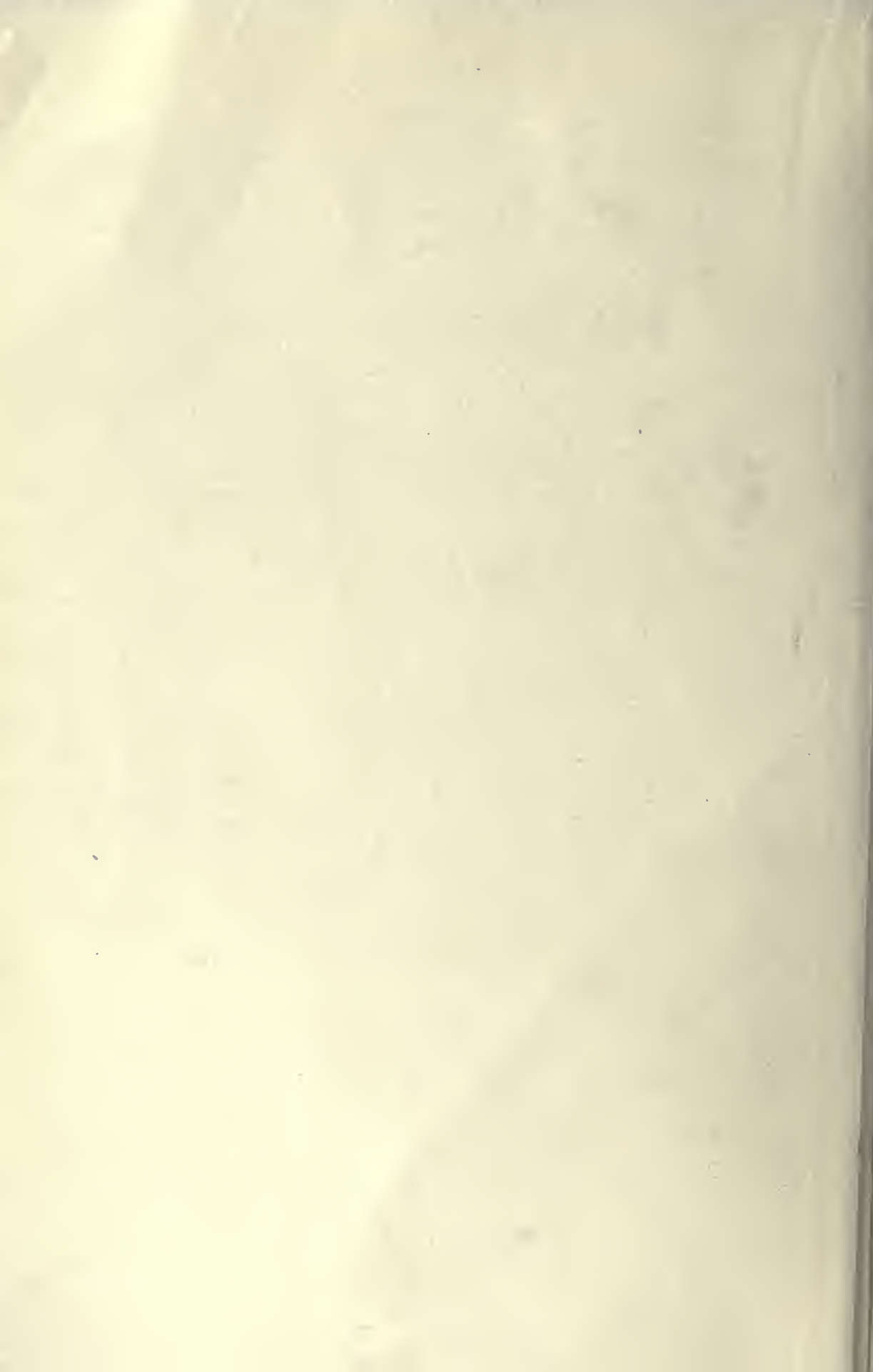
Suppl. Volume

Pl. IV



G. O. Sars, del.

Pseudocyclopia Giesbrechti, Wilfend.

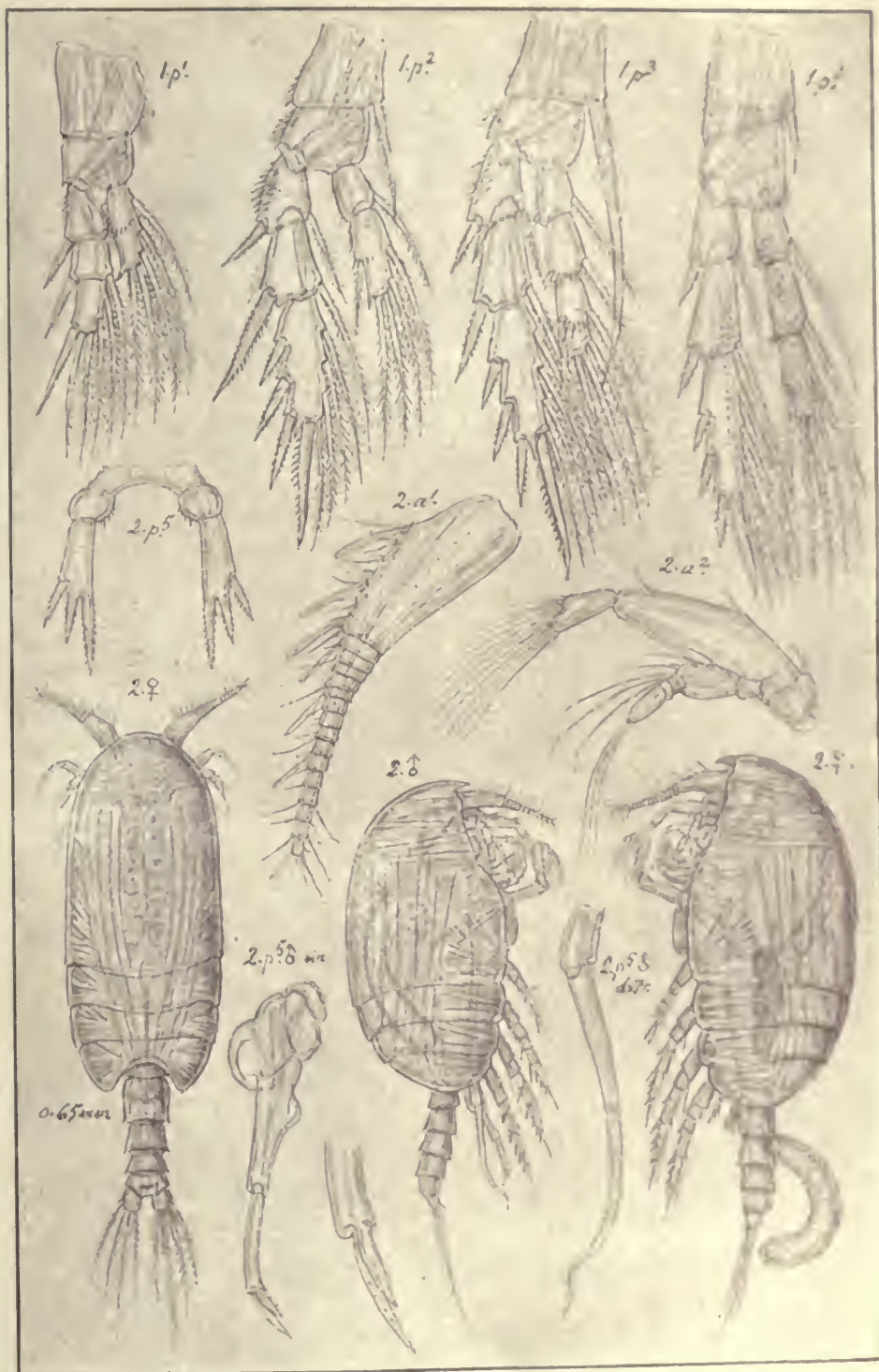


Copepoda

Suppl. Volume

Pseudocycloplidæ

Pl. V



G. O. Sars, del.

1. *Pseudocyclopia Giesbrechti*, Wifend.
(continued)
2. *Pseudocyclopia crassicornis*, Scott



Copepoda

Platycopliidæ

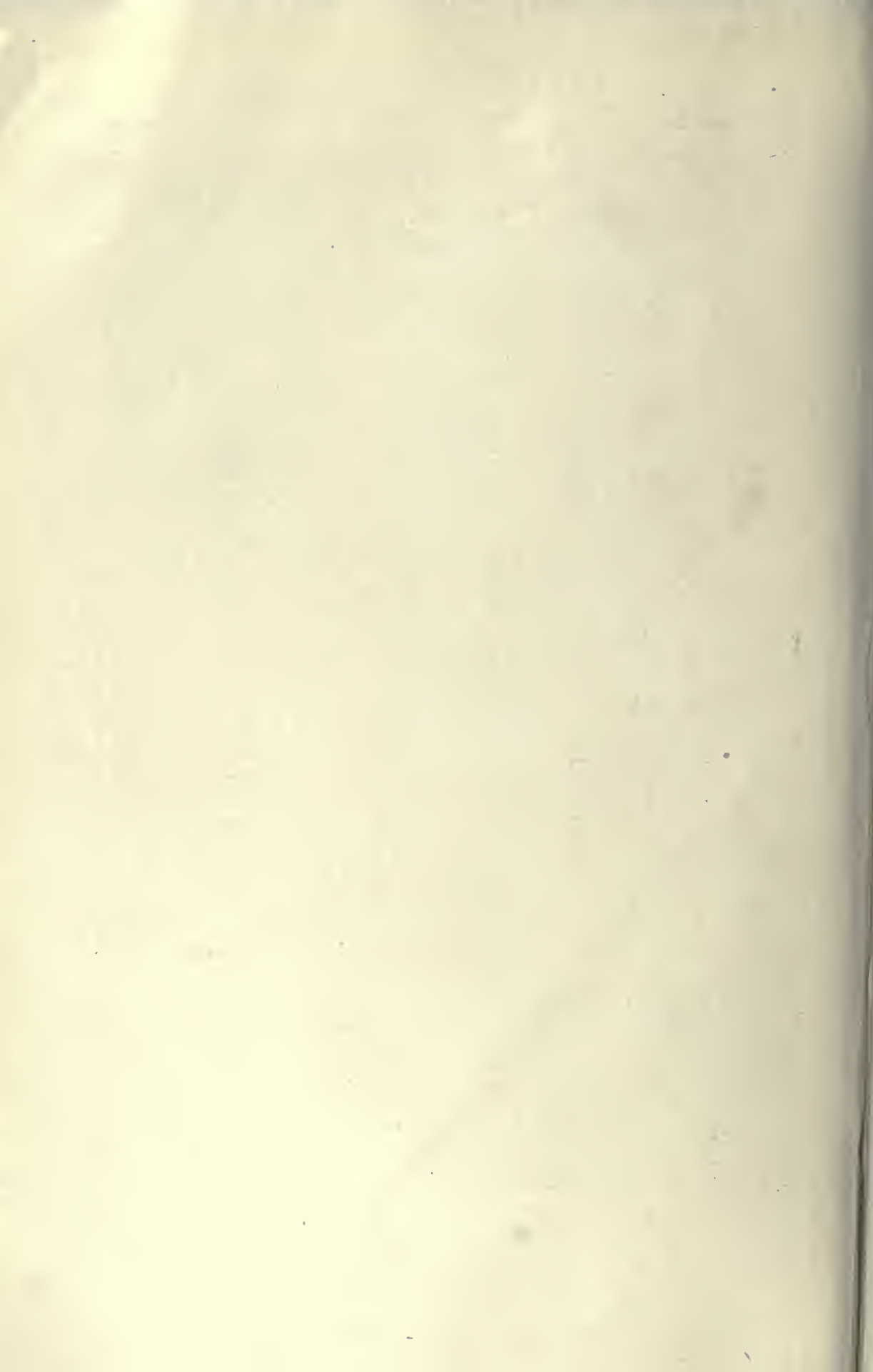
Suppl. Volume

Pl. VI



G. O. Sars, del.

Platycopia perplexa, G. O. Sars

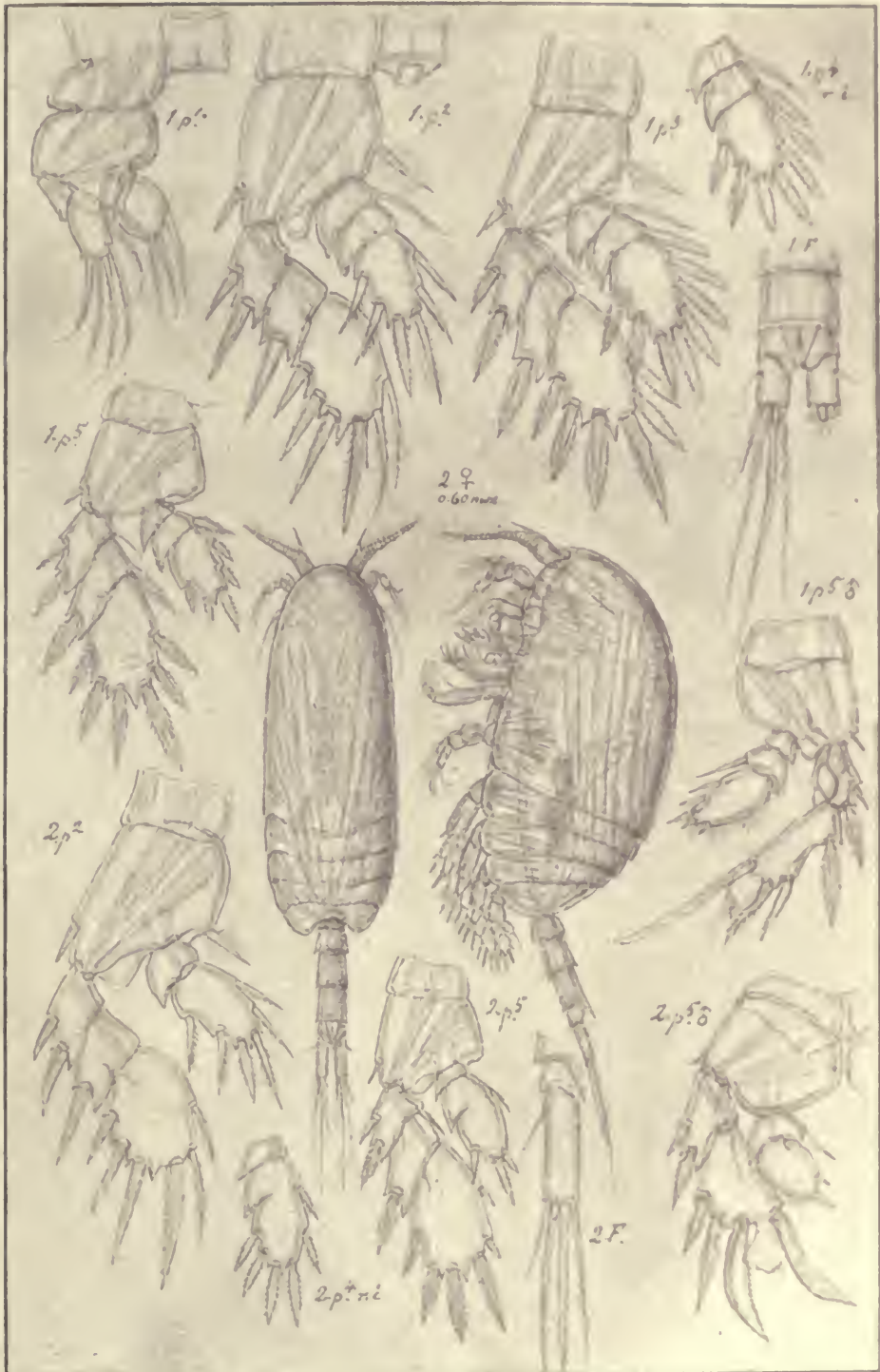


Copepoda

Platycopliidæ

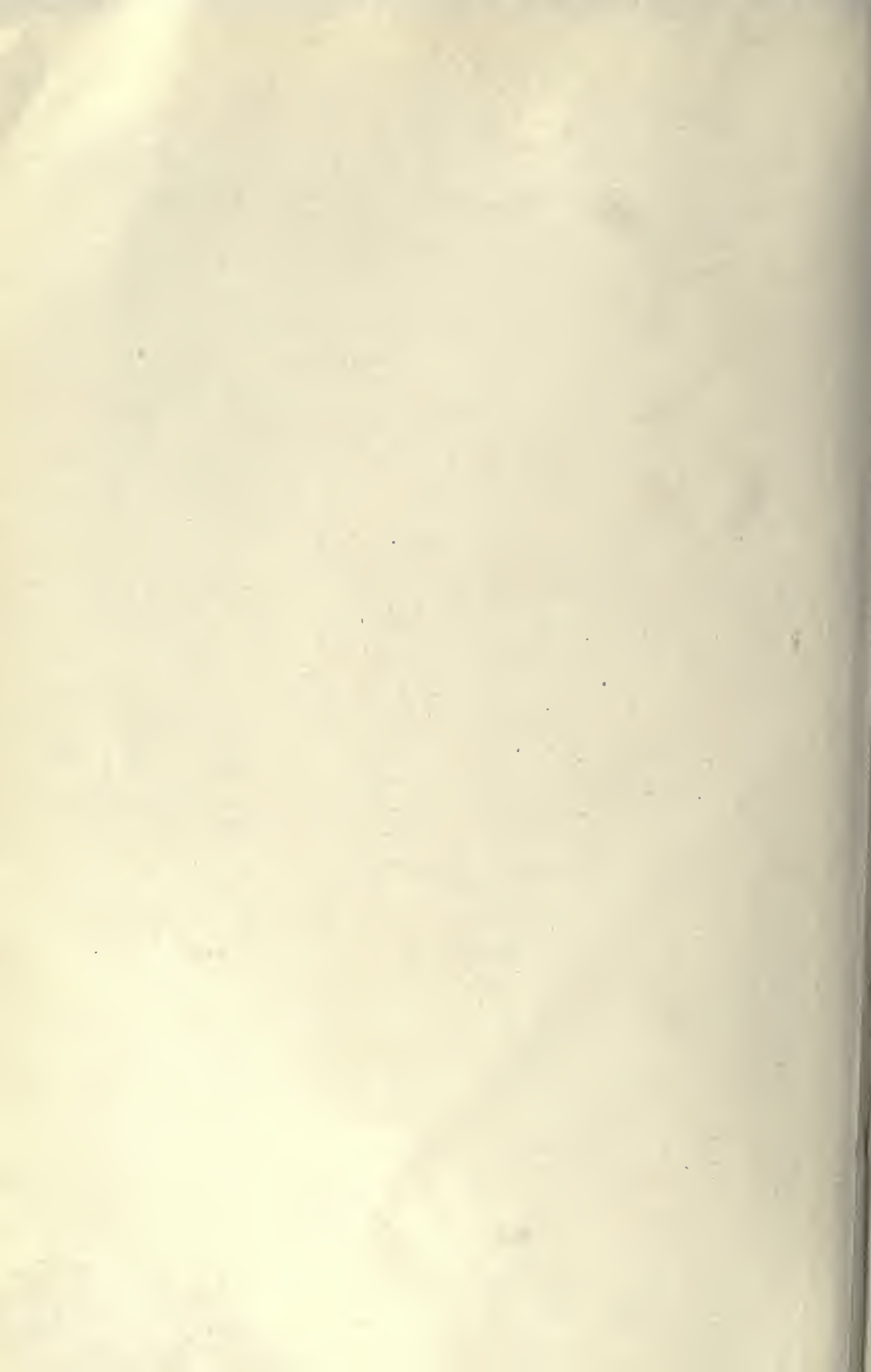
Suppl. Volume

Pl. VII



G. O. Sars, del.

1. *Platycopia perplexa*, G. O. Sars
(continued)
2. *Platycopia pygmæa*, G. O. Sars

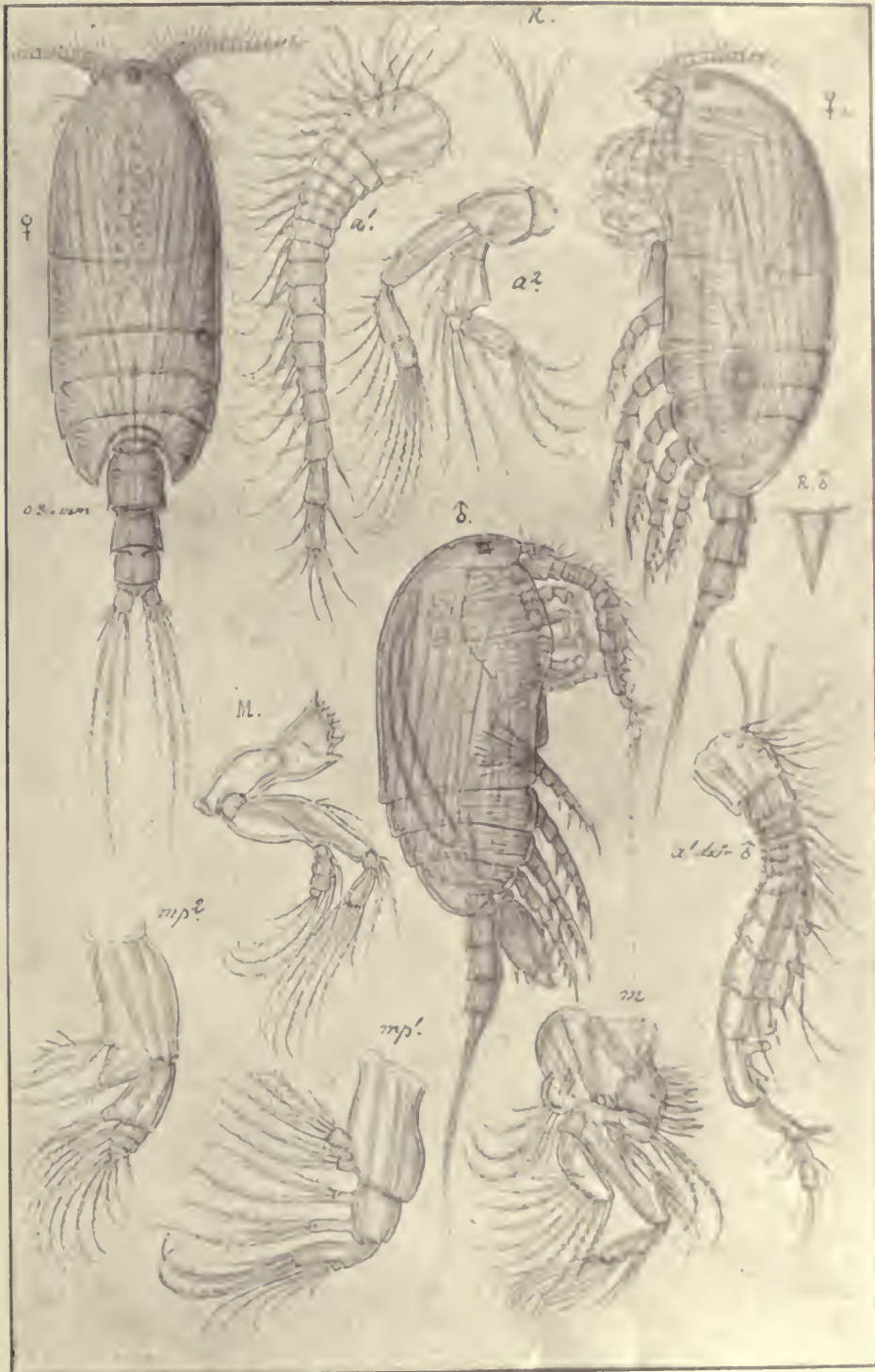


Copepoda

Pseudocyclopidae

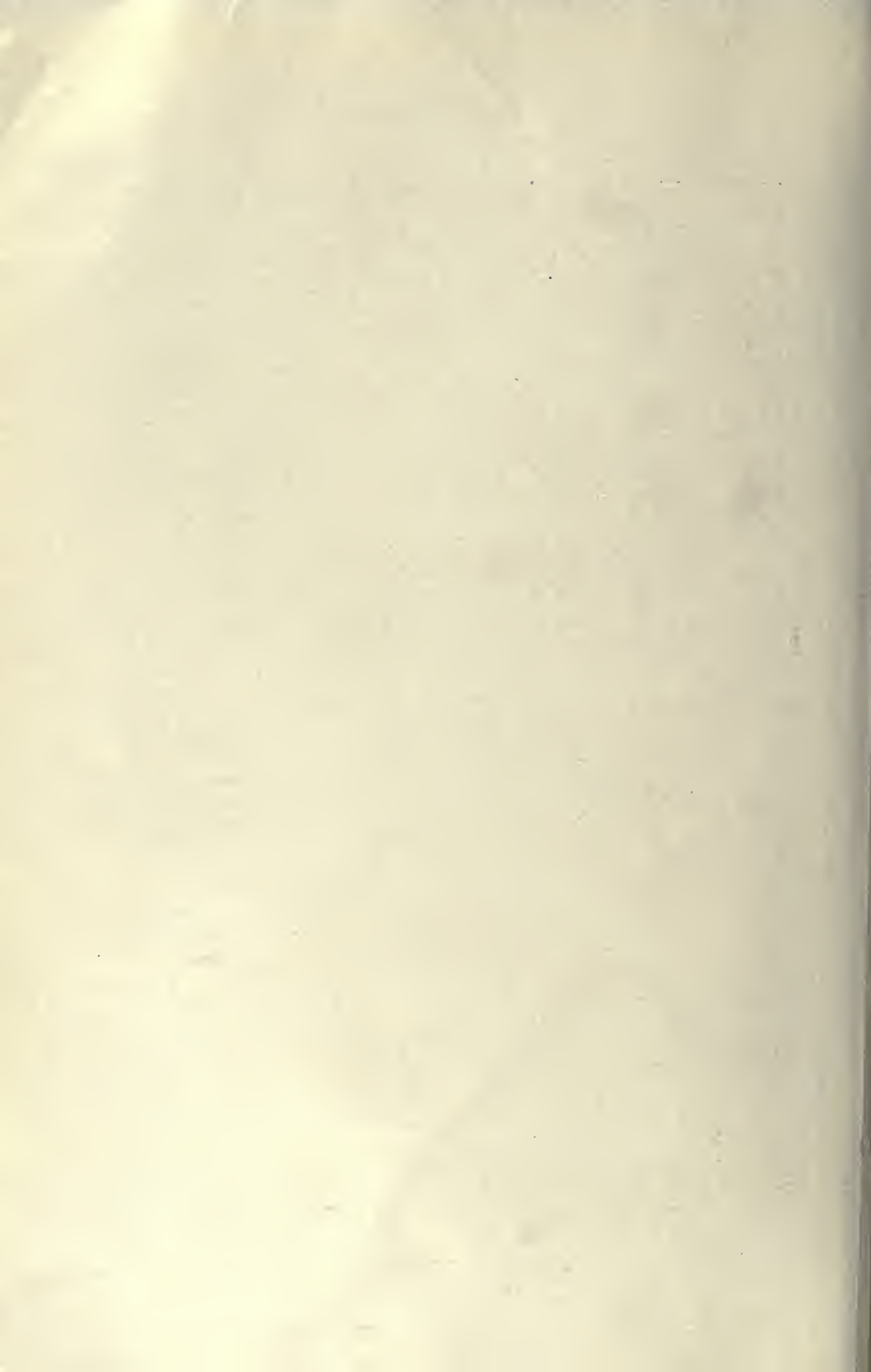
Suppl. Volume

Pl. VIII



G. O. Sars, del.

Pseudocyclops crassiremis, Brady

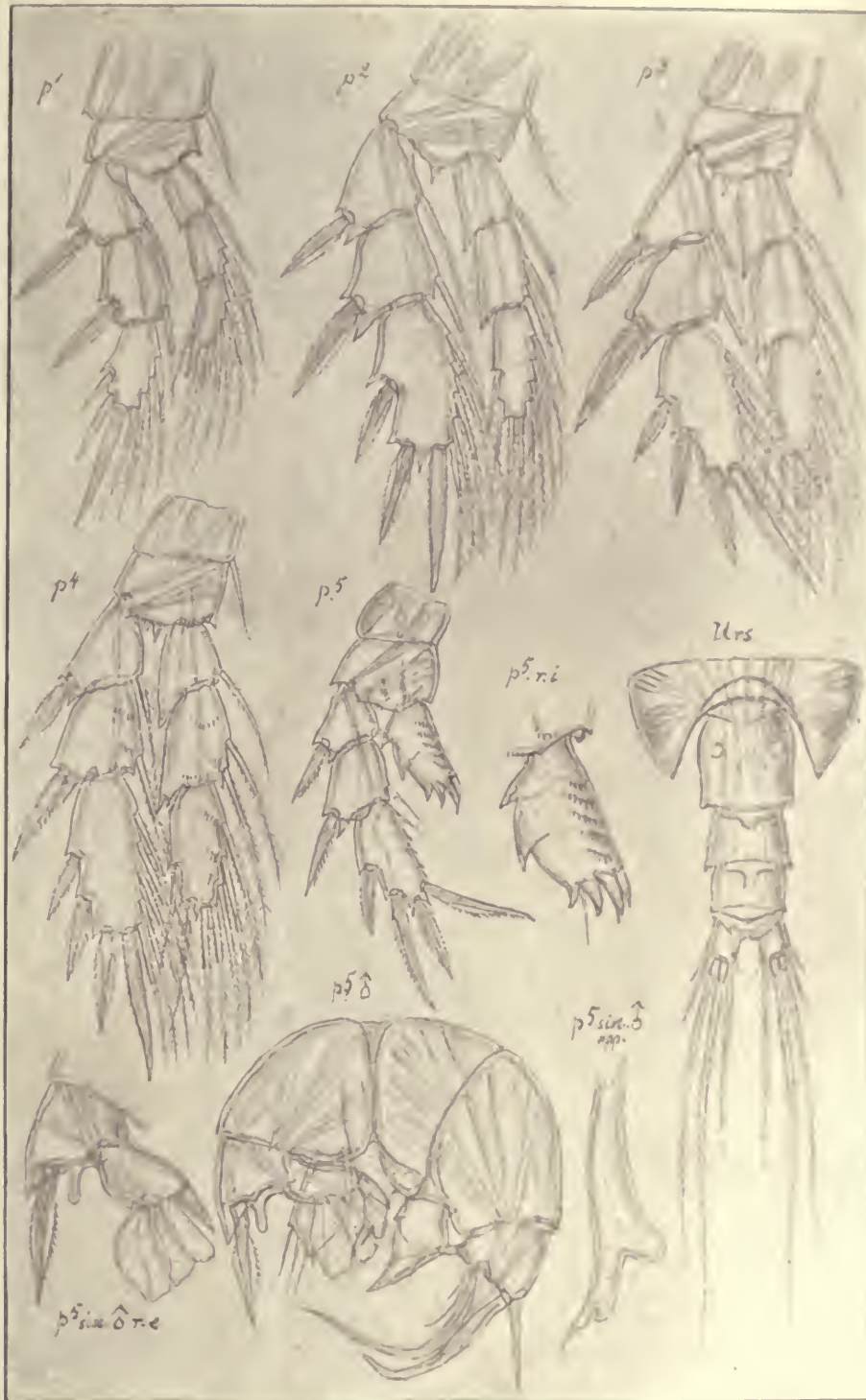


Copepoda

Pseudocyclopidae

Suppl. Volume

Pl. IX



G. O. Sars, del.

Pseudocyclops crassiremis Brady,
(continued)

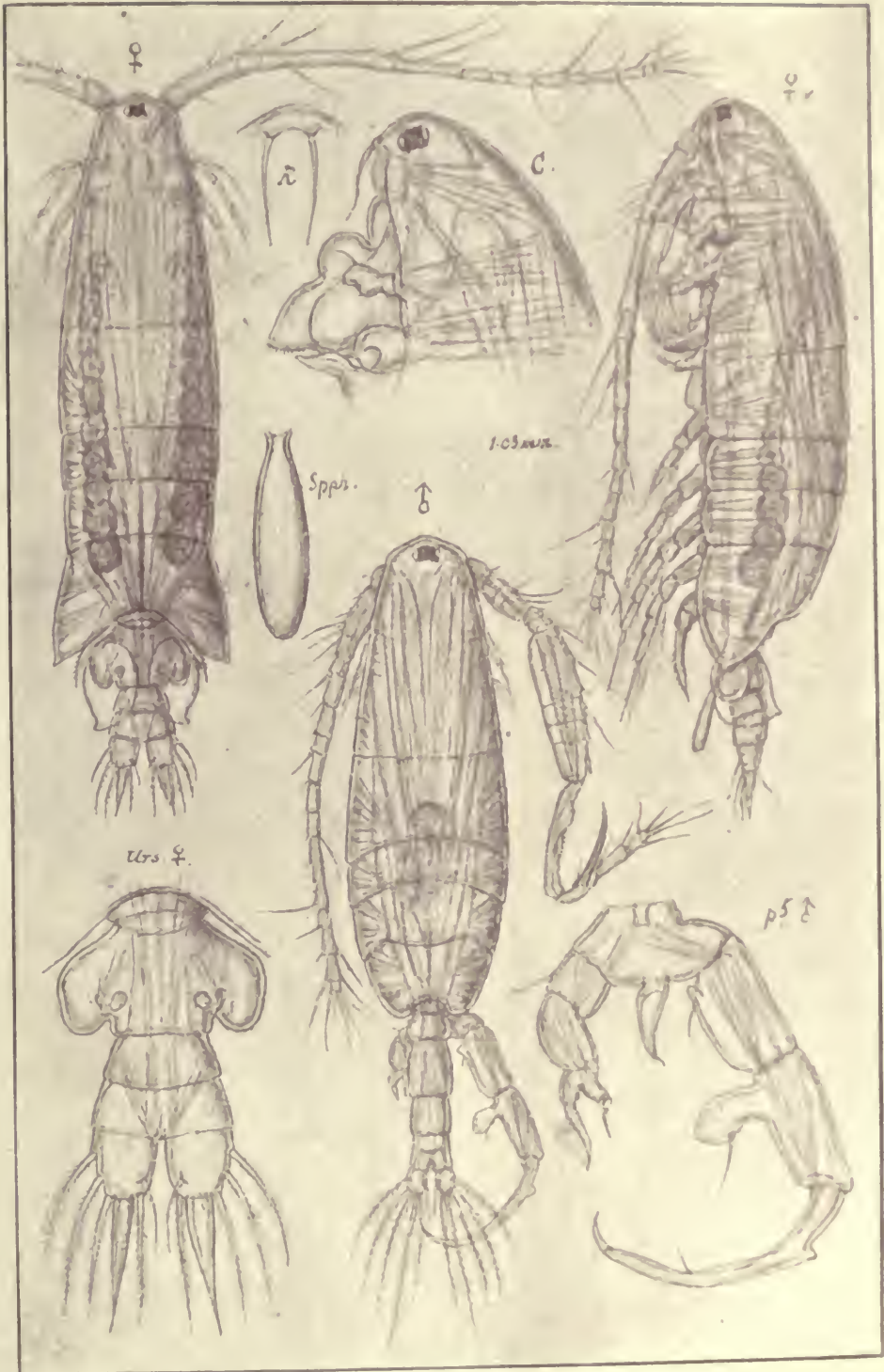


Copepoda

Suppl. Volume

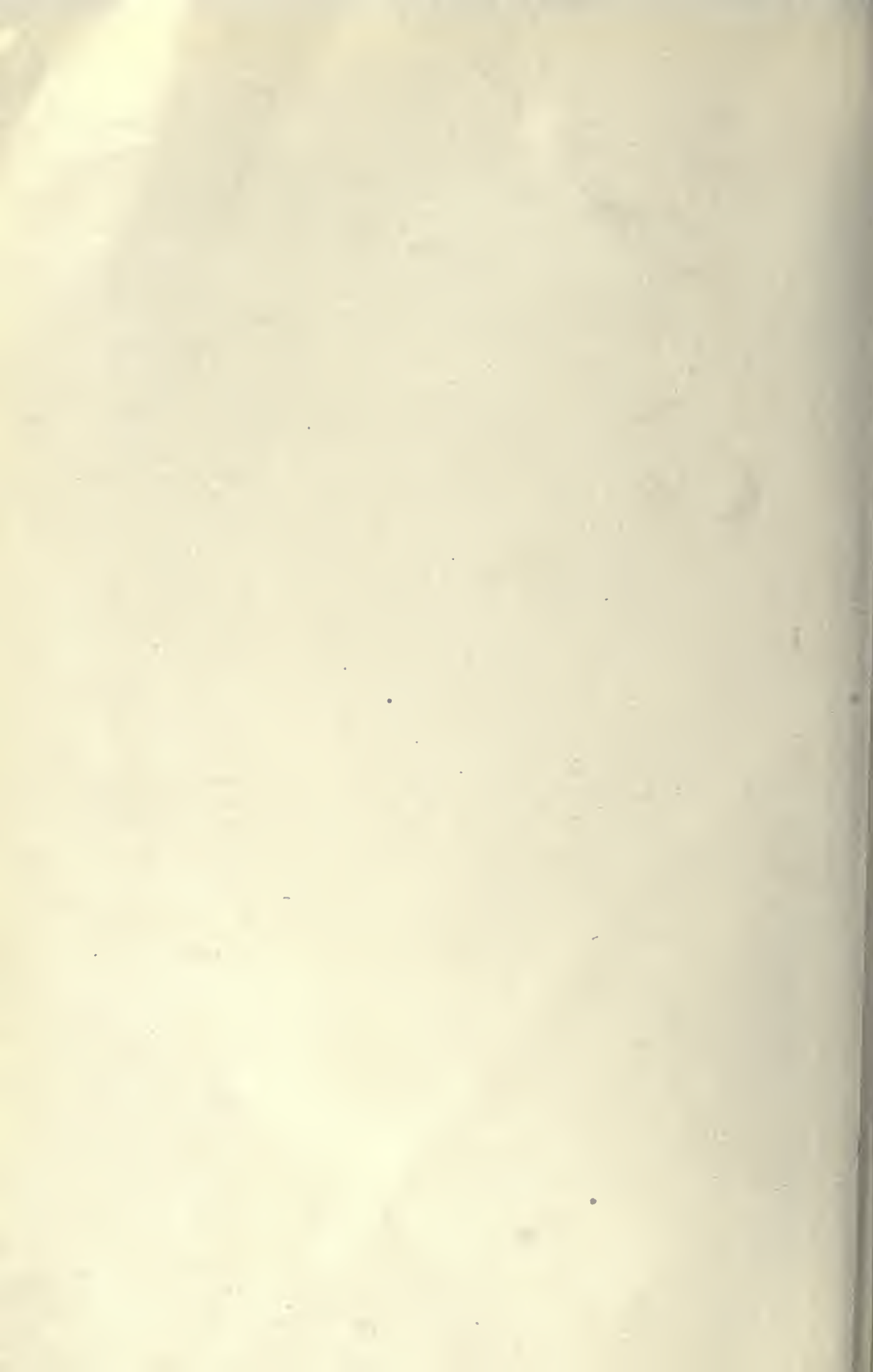
Acartiidae

Pl. X



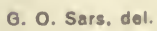
G. O. Sars, del.

Paracartia Grani, G. O. Sars

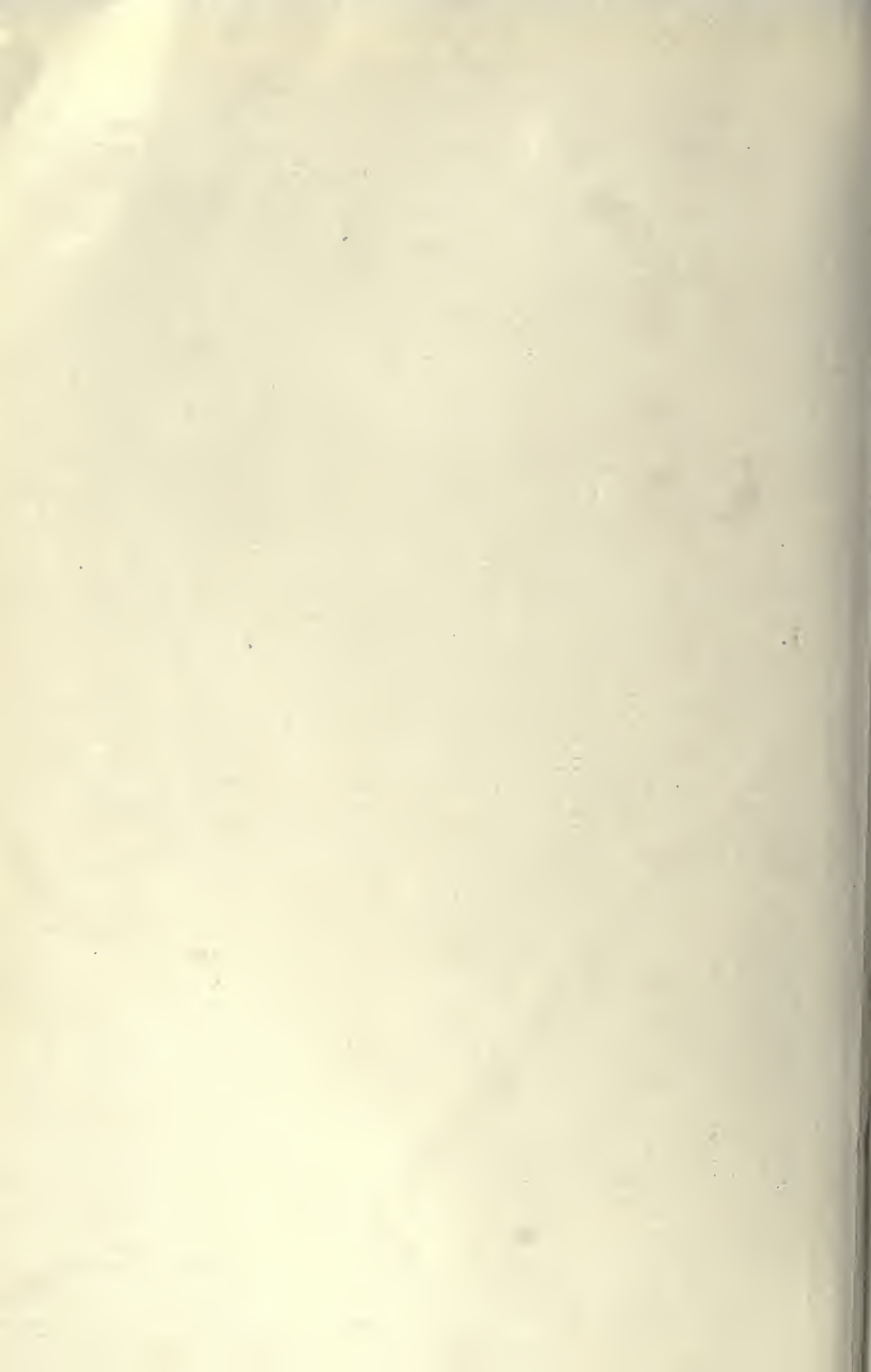


Suppl. Volume

PL. XI



Paracartia Grani. G. O. Sars
(continued)

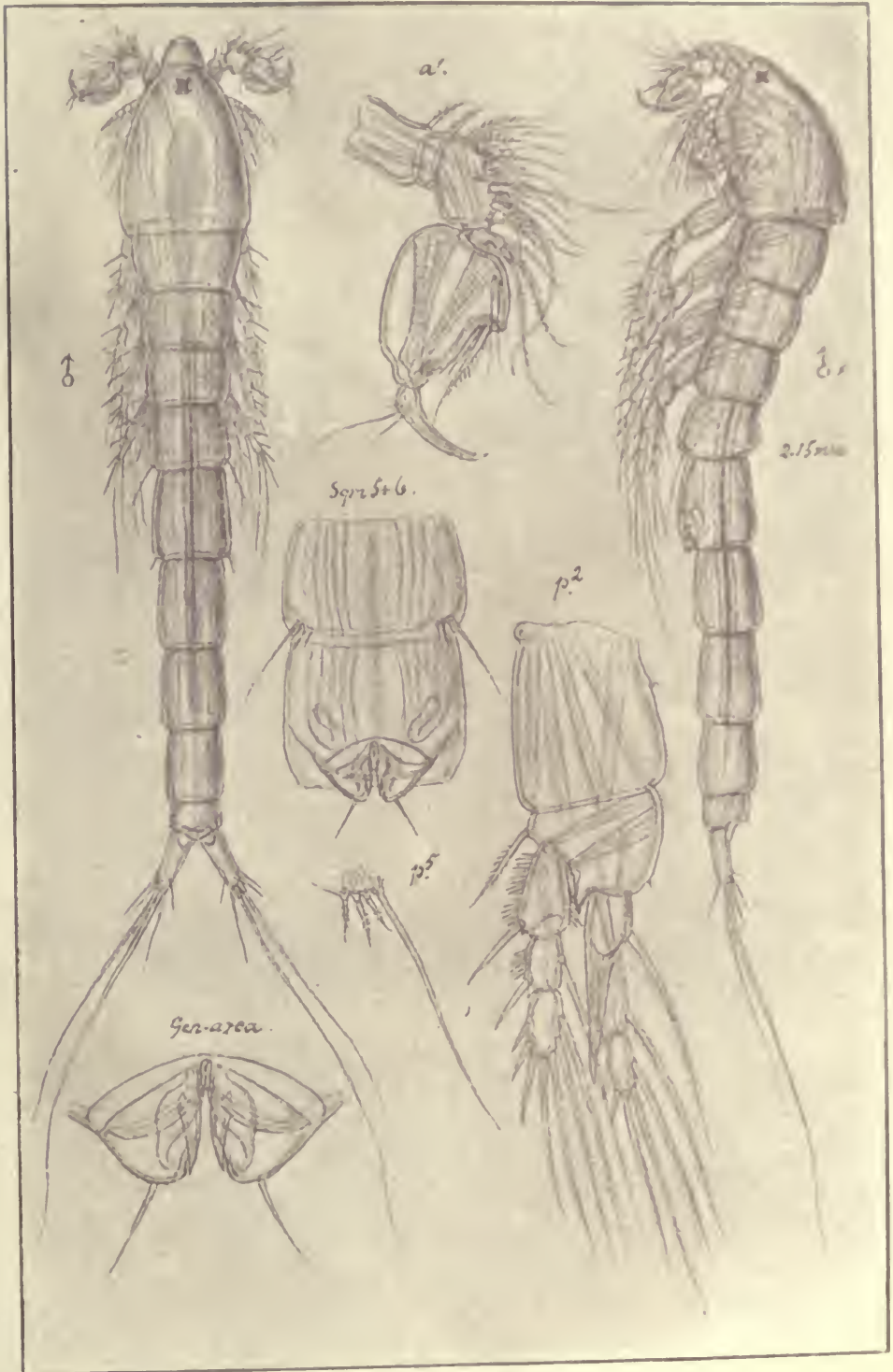


Copepoda

Suppl. Volume

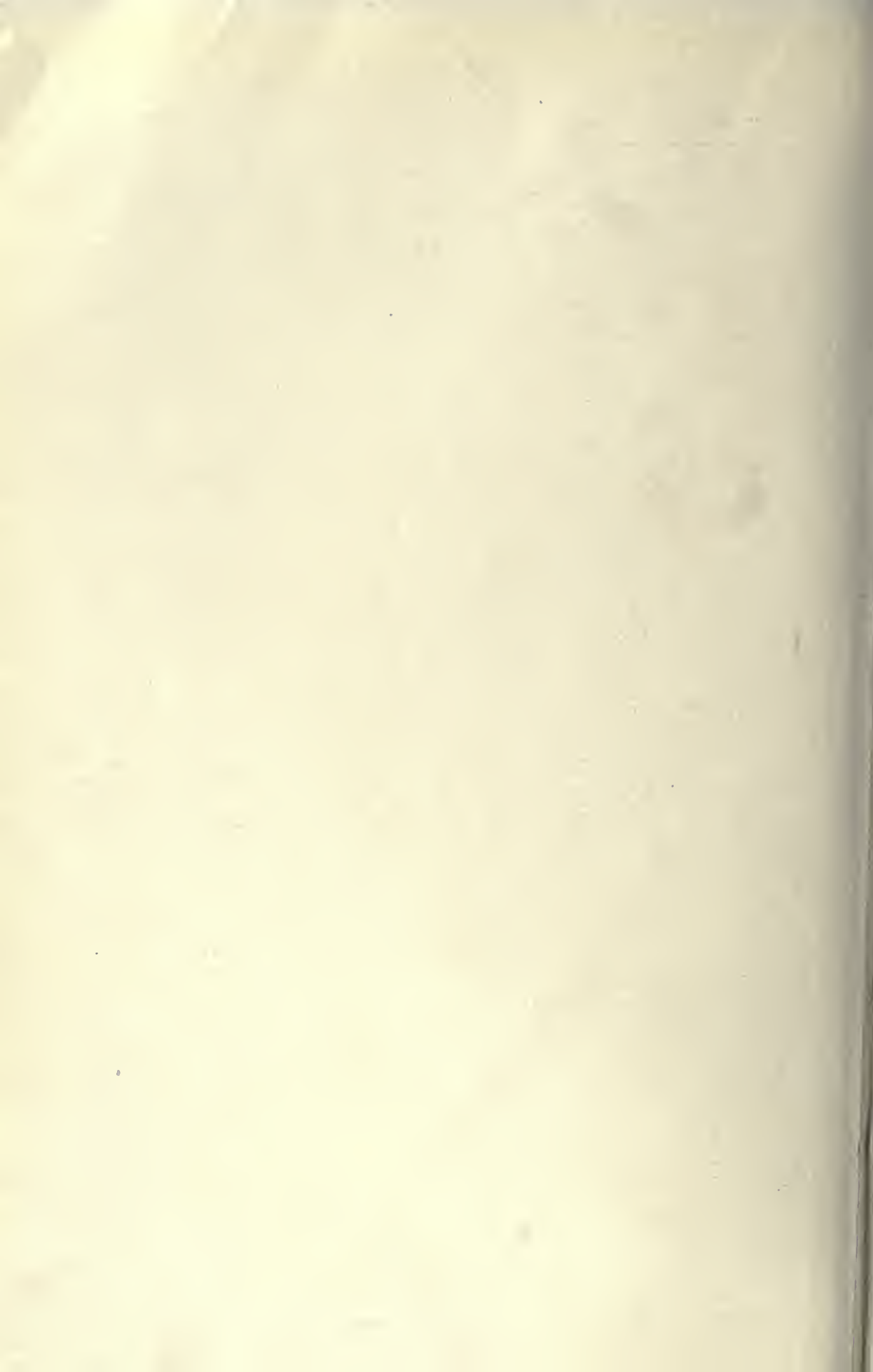
Lônglpediidae

Pl. XII



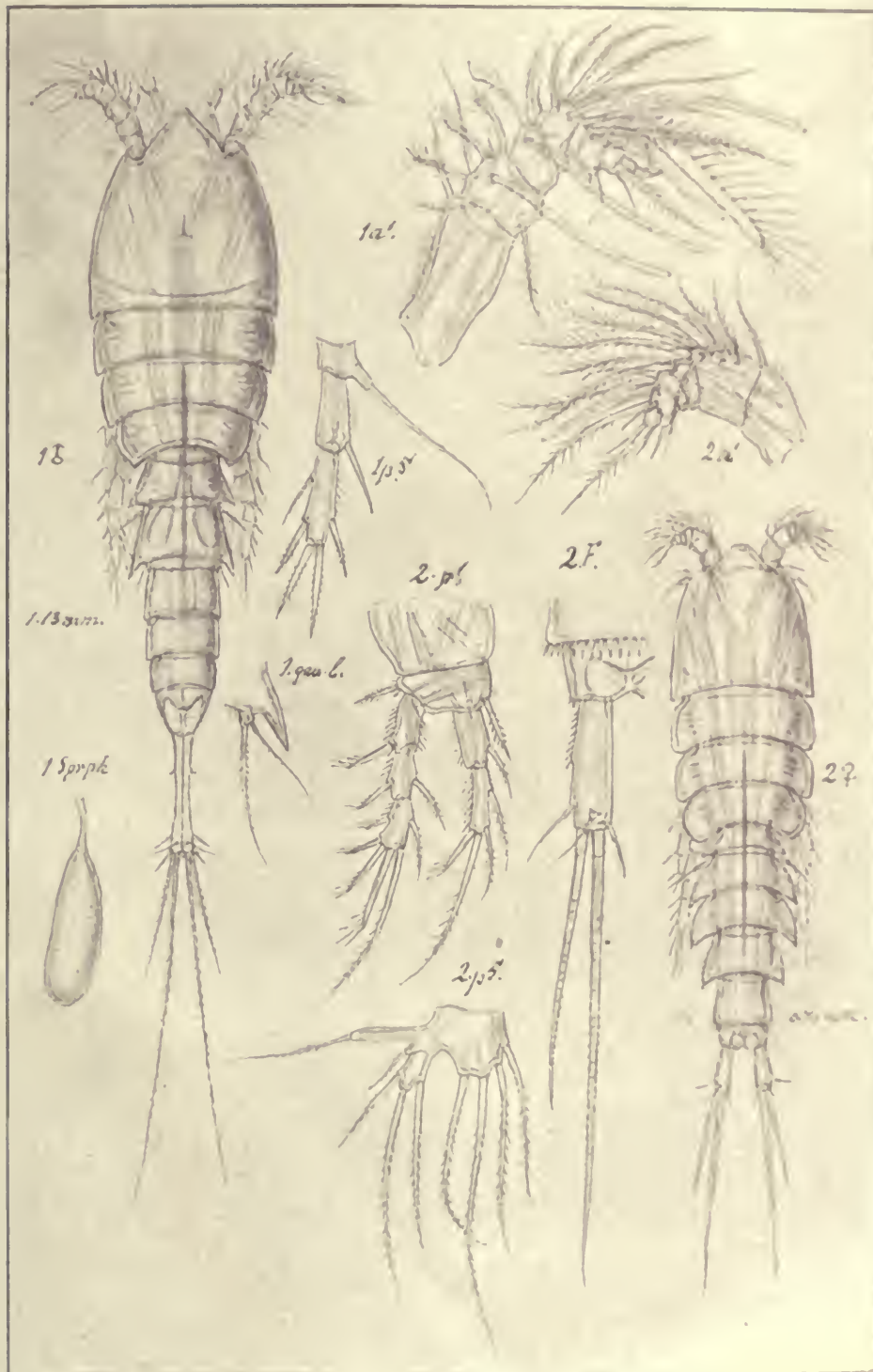
G. O. Sars, del.

Sunaristes paguri, Hesse
(male)



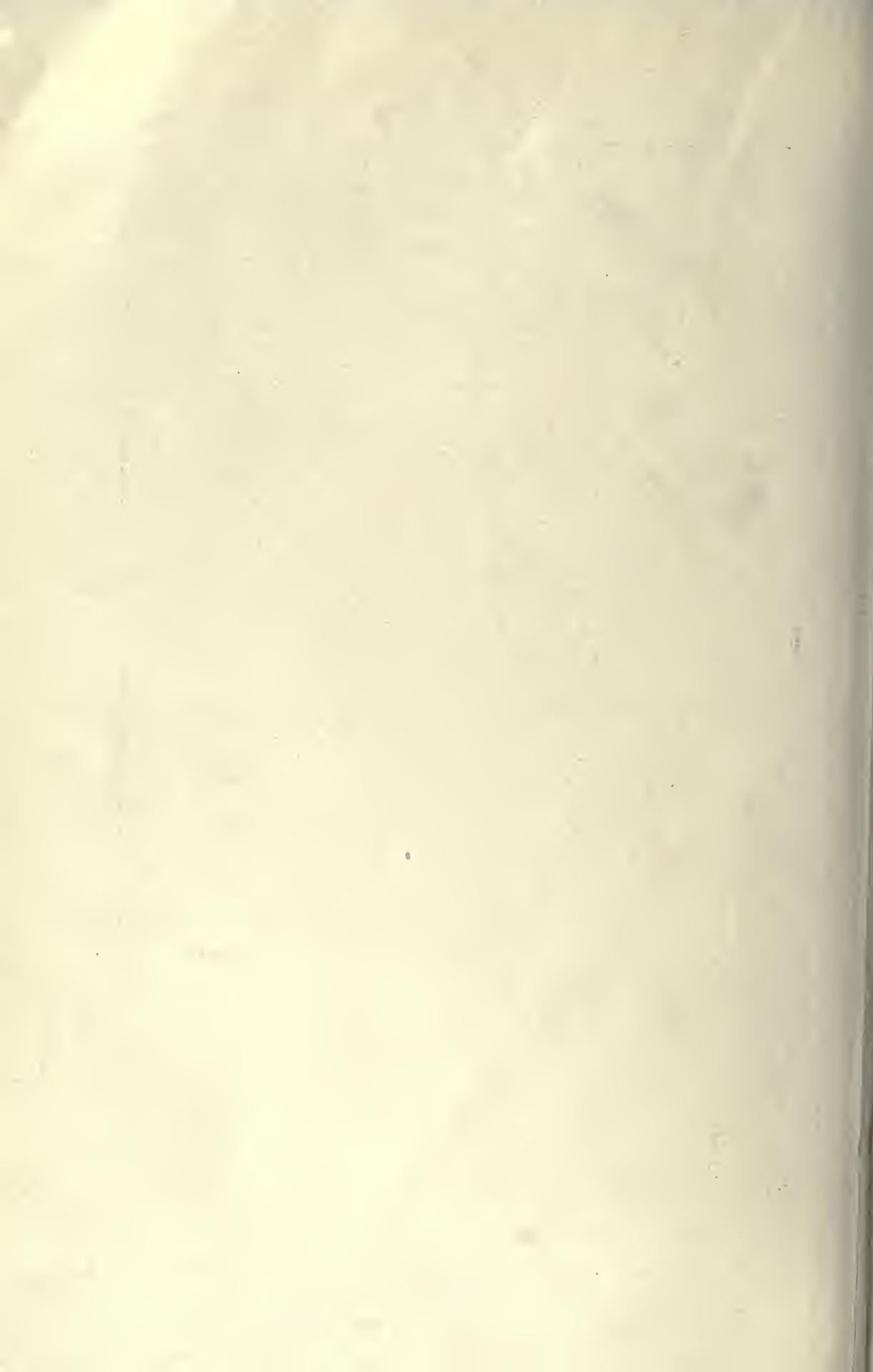
Suppl. Volume

Pl. XIII



1. *Cerviniopsis clavicornis*, G. O. Sars
(male)

2. *Zosime major*, G. O. Sars

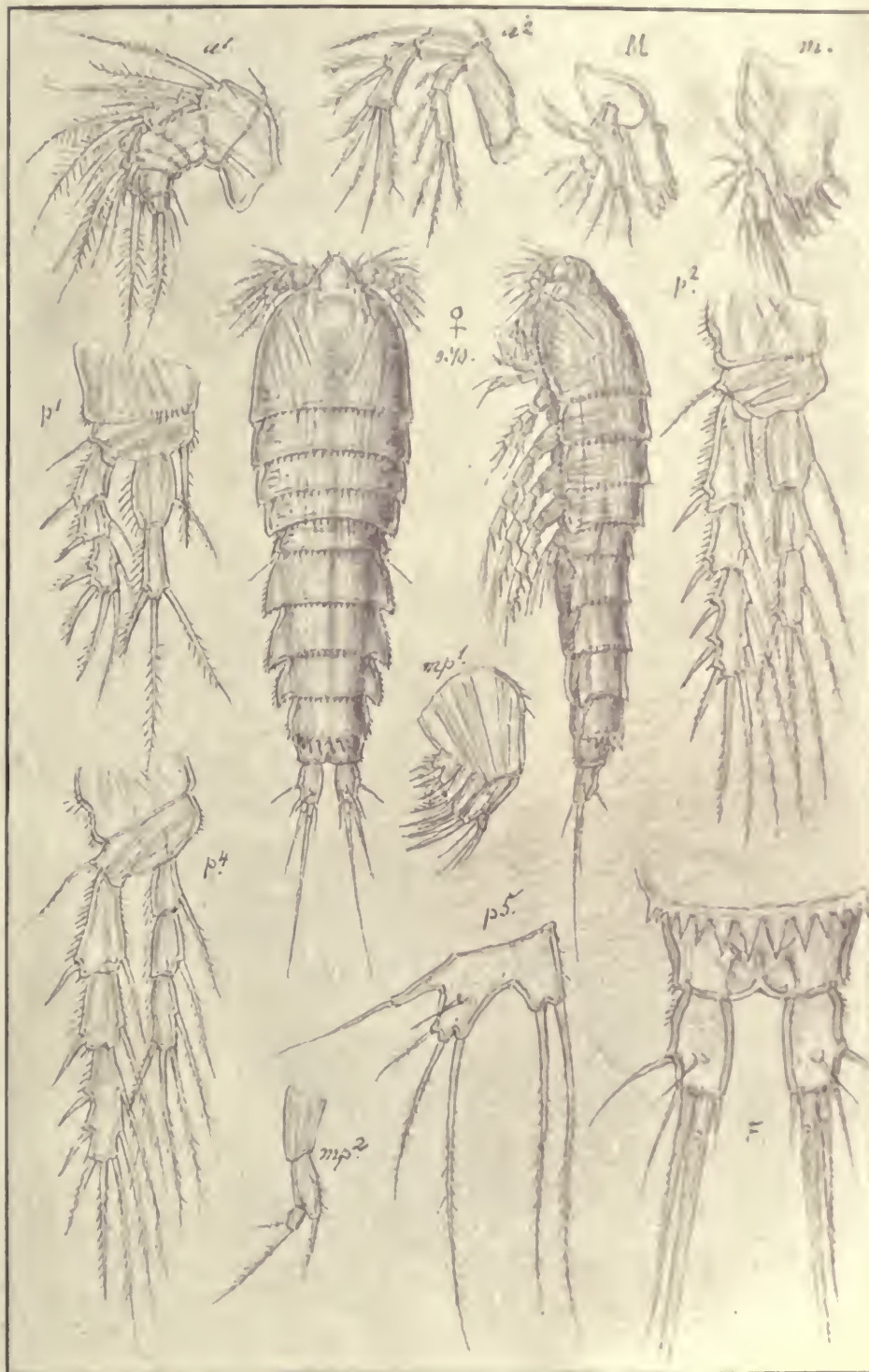


Copepoda

Suppl. Volume

Cerviniidæ

Pl. XIV



G. O. Sars, del.

Zosime valida, G. O. Sars

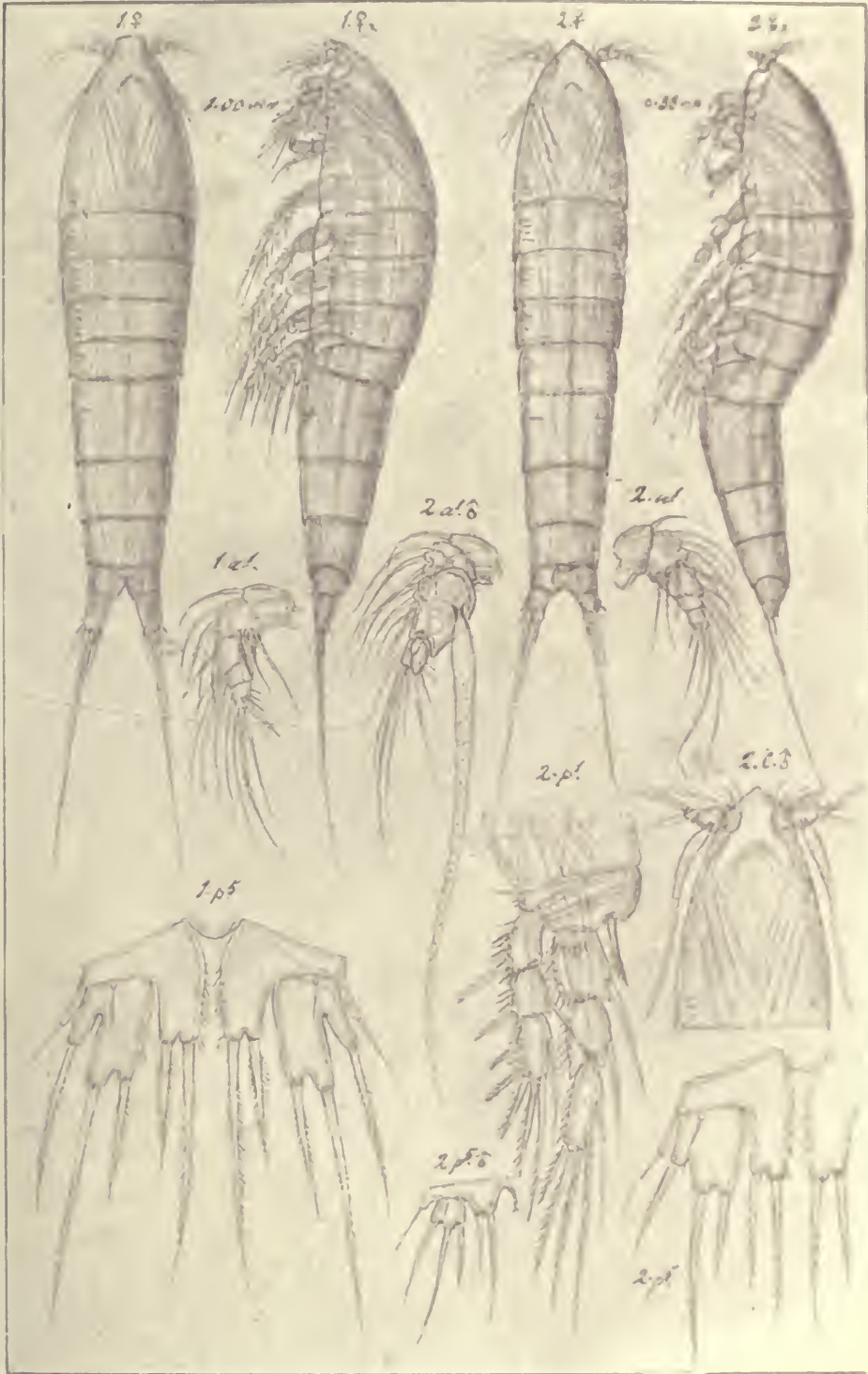


Copepoda

Ectinosomidae

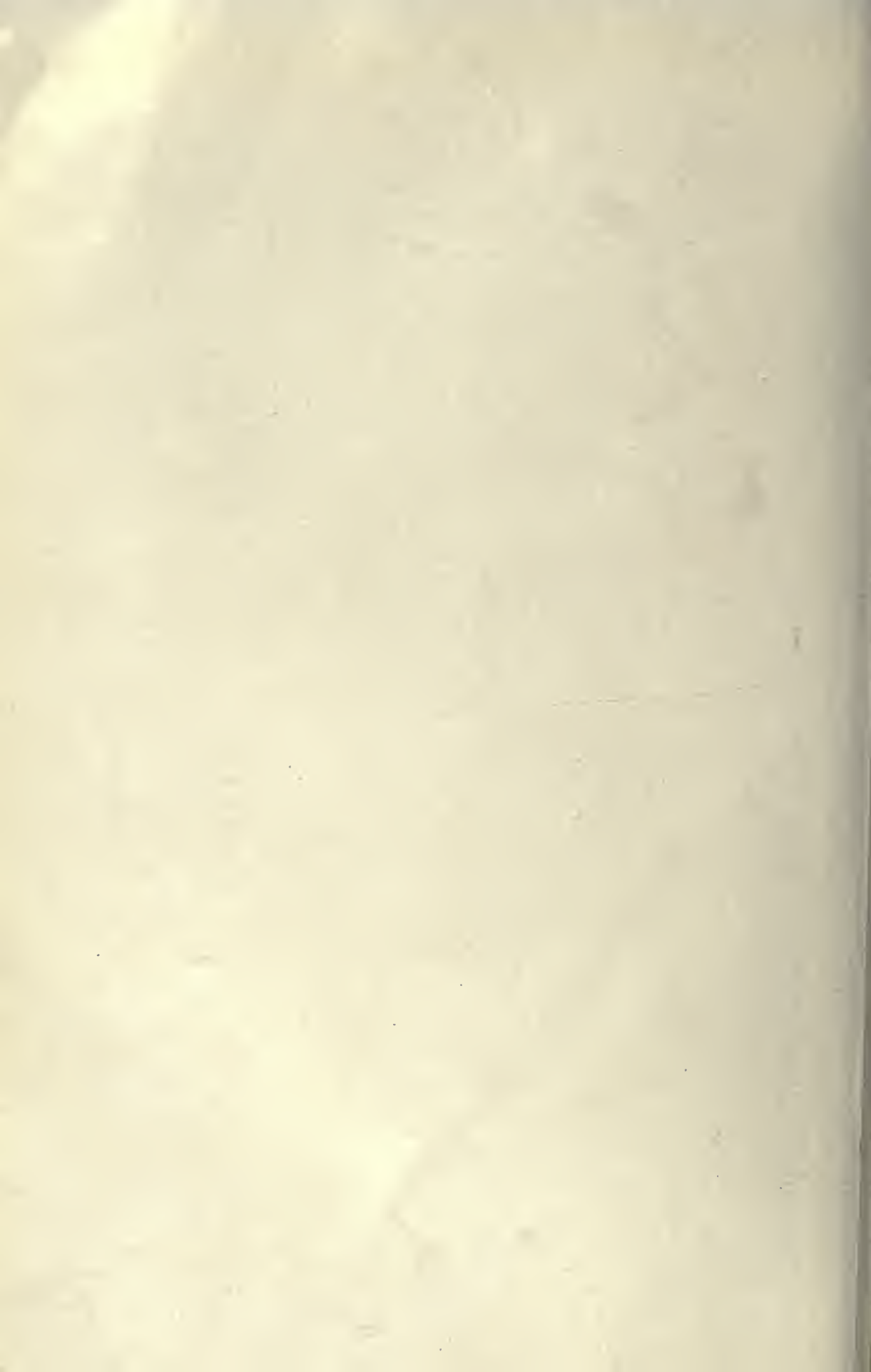
Suppl. Volume

Pl. XV



G. O. Sars, del.

1. *Ectinosoma proximum*, G. O. Sars
2. " *angulifrons*, G. O. Sars



Copepoda

Ectinosomidæ

Suppl. Volume

Pl. XVI



G. O. Sars, del.

1. *Ectinosoma tenerum*, G. O. Sars
2. " *clavatum*, G. O. Sars

of the distal joint; marginal setæ shorter than in the preceding species and rather unequal.

Male much smaller than female, but exhibiting a very similar form of the body. Anterior antennæ transformed in the usual manner, but highly distinguished by the presence of a largely developed æsthetask attached by a short chitinous stalk to the upper face of the greatly tumefied median joint, and extending backwards along the side of the cephalic segment until its very end. Last pair of legs, as usual, much reduced in size.

Colour light yellowish.

Length of adult female 0.88 mm.; that of male 0.72 mm.

Remarks.—This form is nearest allied to *E. propinquum* Scott, but is of more slender form of body, and moreover at once distinguished by the very different shape of the rostral plate, which is far less prominent and not, as in that species, spoon-shaped, but distinctly angular in front.

Occurrence.—I have only met with this form in a single locality on the Norwegian coast, viz., at Risør, where several specimens, both males and females, were found in depths ranging from 30 to 60 fathoms, muddy sand.

16. *Ectinosoma tenerum*, G. O. Sars, n. sp.

(Pl. XVI, fig. 1).

Specific Characters.—*Female.* Body exceedingly slender and narrow, seen dorsally, almost linear in form. All the integuments very thin and pellucid. Rostral plate somewhat prominent and, seen dorsally, narrowly truncated in front, the tip being abruptly recurved. Urosome scarcely exceeding in length the exposed part of the trunk, and very slightly tapered behind; genital segment about the length of the 2 succeeding segments combined; anal segment, as usual, the smallest. Caudal rami very short, being scarcely as long as they are broad; apical setæ of moderate length. Anterior antennæ more slender than in the 2 preceding species and rapidly tapering distally, being composed of 6 well-defined joints, the 2nd of which is somewhat dilated in front. Anterior lip, as in most other species of the present genus, projecting below in an acute recurved process. Anterior maxillipeds unusually powerfully developed, with the 2nd basal joint very large and muscular; apical claws much elongated and abruptly curved in their outer part, which is moreover finely denticulate inside. Posterior maxillipeds very slender and narrow. Natatory legs of the usual appearance. Last pair of legs resembling somewhat in shape those in *E. angulifrons*; outermost lobe of the distal joint, however, far remote from

the other 2, issuing close to the base of the joint; appendicular bristle attached immediately inside this lobe; inner expansion of proximal joint extending beyond the middle of the distal joint; marginal setæ of these legs rather unequal, none of them however of any considerable length.

Colour of the living animal not yet ascertained.

Length of adult female amounting to 0.82 mm.

Remarks.—The present species exhibits some points of affinity both to *E. angulifrons* G. O. Sars and to *E. Herdmani* Scott, differing however from both in the still more slender form of the body and in the powerfully developed anterior maxillipeds. From *E. Herdmani*, which it resembles in the thin and pellucid integuments, it is moreover distinguished by the different form of the anterior lip and by the less strong and rather unequal marginal setæ of the last pair of legs.

Occurrence.—Some specimens of this form, all of the female sex, were picked up from a bottom-sample taken at Korshavn from a depth of about 60 fathoms, coarse muddy sand.

17. *Ectinosoma clavatum*, G. O. Sars, n. sp.

(Pl. XVI, fig: 2).

Specific Characters.—*Female.* Body comparatively robust, subclavate in form, being conspicuously dilated in its anterior part and rapidly tapering behind. Rostral plate not much prominent and obtusely blunted at the end. Urosome considerably exceeding in length the exposed part of the trunk; genital segment not attaining the length of the 2 succeeding segments combined; anal segment scarcely half the size of the preceding segment, and slightly incised behind in the middle. Caudal rami somewhat produced, being considerably longer than they are broad at the base, and only slightly divergent, each ramus exhibiting dorsally a well-marked longitudinal keel; apical setæ somewhat thickened in their proximal part and rather elongated. Anterior antennæ comparatively short, though, as in the preceding species, composed of 6 well-defined joints. Anterior maxillipeds far less robust than in the preceding species, exhibiting the structure usually met with in the species of the present genus. Last pair of legs comparatively large, with the distal joint oblong quadrangular in form and rather regularly trilobate at the end, middle lobe the most prominent; inner expansion of proximal joint extending almost as far as the distal joint; marginal setæ of these legs of rather unequal length, that issuing from the middle lobe of the distal joint being the longest

and extending beyond the genital segment; appendicular bristle attached close to the base of the joint and accompanied by a transverse row of small spinules.

Colour of preserved specimens dark corneous.

Length of adult female 0.78 mm.

Remarks.—This is a well defined and easily recognisable species, being especially distinguished by the comparatively robust, sub-clavate form of the body, as also by the structure of the caudal rami and of the last pair of legs.

Occurrence.—Some few specimens of this form, all of the female sex, were picked up from samples taken at Risør from a depth of about 30 fathoms, muddy sand. A solitary specimen was also obtained at Korshavn from about the same depth.

18. *Ectinosoma compressum*, G. O. Sars, n. sp.

(Pl. XVII, fig. 1).

Specific Characters.—*Female.*—Body rather slender and conspicuously compressed, exhibiting in the dorsal aspect of the animal a very narrow, almost linear form. Cephalic segment scarcely exceeding in length the exposed part of the trunk, and conspicuously contracted in front; rostral plate somewhat prominent and, seen from above, narrowly truncated at the end. Urosome scarcely exceeding in length the exposed part of the trunk and somewhat tapered behind, being covered on the ventral face with small spikes; genital segment fully as long as the 2 succeeding segments combined; anal segment small and deeply incised behind in the middle. Caudal rami quite short, being scarcely longer than they are broad, and somewhat divergent; apical setæ rather elongated. Anterior antennæ comparatively slender and attenuated, being composed of 6 well-defined joints. Anterior maxillipeds rather powerfully developed, though somewhat less so than in *E. tenerum*. Natatory legs with the rami comparatively slender, the outer one in 1st pair extending a little beyond the middle joint of the inner. Last pair of legs closely contiguous in the middle, with the proximal joint rather large and lamellar; distal joint broadly rounded in form, with the 2 outer marginal setæ very long and slender, the innermost one much shorter; appendicular bristle attached to a small digitiform process issuing from the edge between the 2 outermost setæ; inner expansion of proximal joint rather narrow, and extending considerably beyond the middle of the distal joint, its apical setæ very unequal, the inner one much elongated, the outer scarcely $\frac{1}{3}$ as long.

Colour of the living animal not yet ascertained.

Length of adult female 0.75 mm.

Remarks.—The present species is allied to *E. melaniceps* Boeck, but of considerably larger size and more slender form. The pronounced compression of the body is also very characteristic, and has indeed given rise to the specific name here proposed. Finally, well-marked differences are found in the structure of the anterior maxillipeds and of the last pair of legs.

Occurrence.—Some few specimens of this form, all of the female sex, were picked up from samples taken at Korshavn from a depth of about 60 fathoms, coarse muddy sand.

19. *Ectinosoma tenuipes*, Scott.

(Pl. XVII, fig. 2).

Ectinosoma tenuipes, Scott, Revision of the British species belonging to the genera *Bradya* and *Ectinosoma*. Trans. Linn. Soc. of London. Vol. VI, Part 5, p. 436, Pl. 36, figs. 25, 32, 35; Pl. 37, figs. 9, 19, 30, 47; Pl. 38, figs. 12, 17, 36, 52.

Specific Characters.—*Female.* Body considerably shorter and stouter than in the preceding species, with the anterior division somewhat dilated in the middle. Cephalic segment about the length of the exposed part of the trunk and gradually narrowed in front; rostral plate only slightly prominent and, seen from above, obtusely blunted at the tip. Urosome about equalling in length $\frac{2}{3}$ of the anterior division, and rapidly tapered behind; genital segment not fully as long as the 2 succeeding segments combined; anal segment a little shorter than the preceding segment, and deeply incised behind in the middle. Caudal rami short, quadrangular, and slightly divergent; apical setæ rather slender. Anterior antennæ, as in the preceding species, 6-articulate, but somewhat less slender. Anterior maxillipeds less powerful, and of the usual appearance. Natatory legs with the rami comparatively slender and narrow, some of the apical spines and setæ excessively elongated. Last pair of legs resembling in structure those in the preceding species, the distal joint exhibiting a similar broadly rounded form, though distinguished by the presence of a well-marked rounded prominence near the base inside, as also by the less elongated marginal setæ, the outermost of which is much shorter than the middle one; appendicular bristle, as in that species, attached to a narrow digitiform process issuing from the edge between the 2 outermost setæ; inner expansion of proximal joint scarcely extending beyond the middle of the distal joint, its outer apical seta about half the length of the inner and not spiniform.

Colour of the living animal not yet ascertained.

Length of adult female scarcely exceeding 0.60 mm.

Remarks.—This form, first described by Scott in the above-quoted treatise, is far inferior in size to those recorded in the preceding pages, and may moreover easily be recognised by its shorter and stouter body as also by the extraordinary length of some of the spines and setæ attached to the natatory legs. The last pair of legs are built on the same type as in the preceding species and in *E. melaniceps*, though exhibiting some well-marked differences from both of them.

Occurrence.—I have met with this small species in 2 different localities of the south coast of Norway, viz., at Risør and Korshavn. It occurred occasionally in depths ranging from 20 to 100 fathoms.

Distribution.—Scottish coast (Scott).

20. *Ectinosoma distinctum*, G. O. Sars, n. sp.

(Pl. XVIII, fig. 1).

Specific Characters.—*Female.* General form of body somewhat resembling that in *E. tenerum*, though comparatively less slender, the anterior division being slightly dilated in the middle. Cephalic segment exceeding somewhat in length the exposed part of the trunk, and rapidly contracted in front; rostral plate rather prominent and, seen from above, obtusely pointed at the end. Urosome exceeding in length $\frac{2}{3}$ of the anterior division, and only slightly tapered behind; genital segment about the length of the 2 succeeding segments combined; anal segment, as usual, the smallest and only slightly incised behind in the middle. Caudal rami comparatively short, being scarcely longer than they are broad at the base; apical setæ rather slender. Anterior antennæ comparatively short and stout, though composed of 6 well-defined joints. Posterior antennæ with the outer ramus well developed, extending as far as the inner. Anterior maxillipeds with the 2 basal joints of about equal size. Natatory legs built on the usual type, the outer ramus being in 1st pair much smaller than the inner and scarcely extending beyond its middle joint. Last pair of legs, however, exhibiting a rather characteristic structure; distal joint narrow quadrangular in form, with the 2 outermost marginal setæ exceedingly strong and greatly thickened at the base, whereas the innermost seta is quite rudimentary; appendicular bristle rather fully developed and attached close to the base of the joint; inner expansion of proximal joint comparatively short and stout, not nearly extending to the middle of the distal joint, and coarsely ciliated inside, both apical setæ strongly developed and of a similar

appearance to the 2 outermost setæ of the distal joint. Ovisac comparatively small, with a very limited number of ova.

Colour of the living animal not yet ascertained.

Length of adult female 0.51 mm.

Remarks.—The present species is especially distinguished by the peculiar structure of the last pair of legs, which is unlike that in any other known species, though by the strong development of some of the marginal setæ somewhat recalling that in *E. gothiceps* Giesbrecht. The rudimentary condition of the innermost seta in the distal joint is however very characteristic and quite peculiar to the present species.

Occurrence.—Two female specimens only of this form have as yet come under my notice. One of them was picked up from a sample taken at Korshavn from a depth of about 30 fathoms; the other specimen was found last summer at Hvalør, outside the Christiania Fjord.

21. *Ectinosoma obtusum*, G. O. Sars, n. sp.

(Pl. XVIII, fig. 2).

Specific Characters.—*Female.* Body comparatively short and stout, with the anterior division slightly dilated in the middle. Cephalic segment scarcely exceeding in length the 3 succeeding segments combined and, seen dorsally, obtusely rounded anteriorly, the rostral plate being abruptly deflexed and scarcely at all prominent in front. Urosome somewhat exceeding in length the exposed part of the trunk and gradually tapered behind. Caudal rami very short, scarcely as long as they are broad; apical setæ of moderate length. Anterior antennæ comparatively slender and attenuated, 7-articulate. Posterior antennæ with the outer ramus less fully developed than in the preceding species, and not nearly extending as far as the inner. Anterior maxillipeds with the 2nd basal joint somewhat larger than the 1st. Natatory legs of the usual structure. Last pair of legs built on the same type as in *E. melaniceps* and allied species; distal joint comparatively broad and somewhat oblique, with a small tuberculiform prominence inside the middle, terminal edge irregularly lobular, and exhibiting, somewhat outside the middle, a deep incision separating the outermost lobe from the other 2, which are closely juxtaposed and occupy the most prominent part of the joint; marginal setæ of moderate length and somewhat unequal, the innermost one being the shortest, but of rather coarse structure, almost spiniform; appendicular bristle very small and attached to a well defined lobule issuing from the edge immediately inside the outermost

marginal seta; inner expansion of proximal joint rather narrow and extending about to the middle of the distal joint, outer apical seta comparatively short and stout, spiniform.

Colour of the living animal not yet ascertained.

Length of adult female 0.47 mm.

Remarks.—In its general appearance this form looks not unlike *E. brevirostre* G. O. Sars, from which species it may however at once be distinguished by the much shorter caudal rami, and more particularly by the very different structure of the last pair of legs. It is also of rather inferior size.

Occurrence.—A solitary female specimen only of this form has as yet come under my notice. It was picked up from a sample taken at Korshavn from a depth of about 30 fathoms.

Gen. *Pseudobradya*, G. O. Sars.

Remarks.—This genus was established in the year 1911 by the present author, to comprise some species referred by Scott to the genus *Bradya* of Boeck, but differing from that genus in several points, both as regards the outward appearance and the structure of some of the appendages. Seven species of this genus have been described in Vol. V of the present work, and I am now enabled to add no less than 10 species, all of them new to science. The total number of Norwegian species is thereby increased to 17 in all.

22. *Pseudobradya digitata*, G. O. Sars, n. sp.

(Pl. XIX).

Specific Characters.—*Female.* Body moderately slender, with the anterior division only slightly dilated in the middle. Cephalic segment much shorter than the exposed part of the trunk, equalling about in length the 3 succeeding segments combined; rostral plate short and somewhat deflexed, with the end obtusely rounded. Urosome attaining in length about $\frac{3}{4}$ of the anterior division and slightly tapered behind; genital segment, of moderate size; anal segment about half the length of the preceding segment and slightly incised behind in the middle. Caudal rami somewhat longer than they are broad at the base and only slightly divergent, apical setæ not much elongated. Anterior antennæ very short and stout, though apparently composed of 6 joints clothed with strong curved setæ. Posterior antennæ with the inner ramus rather strongly built, outer one extending almost as far as the inner, and distinctly

3-articulate. Oral parts, as in the other species of the present genus, rather feebly developed. Natatory legs with the rami moderately slender, the inner one in 1st pair somewhat longer than the outer, in the succeeding pairs of about same length, 1st joint of this ramus wanting the usual seta inside, but produced at the end to a sharp corner; 2nd joint of same ramus armed in the 2 middle pairs with a well-marked spine inside in addition to the seta. Last pair of legs largely developed, with the distal joint spatulate in form and divided at the end into 3 nearly equal, digitiform lobes separated by deep incisions and clothed with slender spinules, each lobe carrying a well developed seta, that of the middle lobe being, as usual, the longest and extending almost to the end of the 2nd caudal segment, innermost seta shorter than the other 2, but considerably coarser, almost spiniform; appendicular bristle well developed and attached near the base of the joint, being accompanied with a transverse row of small spinules; inner expansion of proximal joint scarcely extending to the middle of the distal joint and clothed with a number of small spinules, both apical setæ rather slender and nearly equal.

Colour of the living animal not yet ascertained.

Length of adult female somewhat exceeding 1 mm.

Remarks.—In size and general appearance this form looks not unlike *Ectinosoma neglectum* G. O. Sars, and may at the first sight easily be confounded with it. On a closer examination, however, it is found to be very different and unquestionably belonging to the present genus. It is the largest of the known species, and may moreover be recognised from any of them by the structure of the last pair of legs.

Occurrence.—Some few specimens of this handsome species were picked up from samples taken at Risør from a depth of about 50 fathoms, muddy sand. I have not met with it in any other place on our coast.

23. *Pseudobradia leptognatha*, G. O. Sars, n. sp.

(Pl. XX).

Specific Characters.—*Female.* Body rather slender, with the anterior division somewhat dilated in the middle. Cephalic segment fully as long as the exposed part of the trunk and rapidly narrowed in front; rostral plate comparatively small and obtusely rounded at the end. Urosome about equalling in length $\frac{3}{4}$ of the anterior division and rapidly tapered behind; genital segment rather large, though not fully attaining the length of the 2 succeeding segments combined; anal segment comparatively small and minutely incised

behind in the middle. Caudal rami about twice as long as they are broad and not at all divergent, each having a well-marked keel along the dorsal face; apical setæ comparatively short. Anterior antennæ very small, 5-articulate. Posterior antennæ considerably more slender than in the preceding species, with the outer ramus scarcely half as long as the inner and only composed of 2 joints, the proximal one very small. Mandibles and maxillæ of about same structure as in the preceding species. Anterior maxillipeds however rather different, being much reduced in size and simple cylindric in form, with none of the joints dilated. Posterior maxillipeds normally developed. Natatory legs comparatively more slender than in the preceding species, and not exhibiting any peculiarity in their structure. Last pair of legs comparatively large, with the distal joint oval in form, its terminal lobes far less sharply marked off from each other than in the preceding species and somewhat unequal, the outermost one being placed rather in front of the other 2; marginal setæ moderately slender, the innermost one the shortest and not spiniform; appendicular bristle well developed and attached at a short distance from the base of the joint; inner expansion of proximal joint rather narrow and extending somewhat beyond the middle of the distal joint, outer apical seta much shorter than the inner, which is attached somewhat more in front.

Colour of the living animal not yet ascertained.

Length of adult female, 0.78 mm.

Remarks.—The present form is especially distinguished by the peculiar rudimentary condition of the anterior maxillipeds, a character by which it differs from any of the other known species, and which indeed has given rise to the specific name here proposed. It also exhibits some other well-marked differences from the other species, as pointed out in the above diagnosis.

Occurrence.—A solitary female specimen only of this distinct species has hitherto come under my notice. It was found in a sample taken at Risør in the same place as the preceding species.

24. *Pseudobradia scabriuscula*, G. O. Sars, n. sp.

(Pl. XXI).

Specific Characters.—*Female.* Body moderately slender, with the anterior division scarcely at all dilated in the middle. Cephalic segment slightly exceeding in length the exposed part of the trunk, and gradually narrowed in front; rostral plate somewhat prominent and obtusely pointed at the end. Urosome

about equalling in length $\frac{3}{4}$ of the anterior division, and only slightly tapered behind, its segments successively diminishing in size and, like the trunkal segments, provided, in addition to the usual spinulation of the hind edge, with a transverse row of small spinules across the middle of the back. Caudal rami comparatively short, scarcely longer than they are broad at the base; apical setæ not much elongated. Anterior antennæ very small, 6-articulate. Posterior antennæ with the outer ramus rather slender, extending almost as far as the inner, and 3-articulate, the first 2 joints very small. Oral parts of normal structure. Natatory legs comparatively slender, with the rami somewhat unequal in length; the inner one being in 1st pair longer than the outer, in the succeeding pairs rather shorter; middle joint of this ramus in 3rd pair with 2 well-developed setæ inside. Last pair of legs somewhat resembling in shape those in *P. digitata*, the distal joint being rather large and spatulate in form, though having the surface nearly smooth and the terminal lobes less sharply marked off from each other, innermost marginal seta very slender and longer than the other 2, which are nearly equal; appendicular bristle well developed and attached close to the base of the joint; inner expansion of proximal joint extending nearly to the middle of the distal joint, apical setæ rather unequal, the outer one the shorter and spiniform.

Colour of the living animal not yet ascertained.

Length of adult female 0.75 mm.

Remarks.—The present species may be easily distinguished from the 2 preceding ones by the somewhat less slender form of the body and by the rather conspicuous spinulose armature of the segments, giving the body a somewhat scabrous appearance; hence the specific name here proposed. Moreover some well-marked differences are found in the structure of some of the appendages, as pointed out in the above diagnosis.

Occurrence.—Two female specimens only of this form have as yet come under my notice. They were found in a sample taken at Risør in about the same place, where the 2 preceding species occurred.

25. *Pseudobradia attenuata*, G. O. Sars, n. sp.

(Pl. XXII).

Specific Characters.—*Female.* Body very slender, elongate subfusiform in shape, being conspicuously attenuated both in front and behind. Cephalic segment occupying about half the length of the anterior division and rapidly narrowed in front; rostral plate somewhat prominent and obtusely acuminate at the end.

Urosome exceeding somewhat in length $\frac{3}{4}$ of the anterior division and gradually tapered behind; genital segment much larger than the succeeding one; anal segment about half the length of the preceding one and slightly incised behind in the middle. Caudal rami a little longer than they are broad and not at all divergent; apical setæ of moderate length. Anterior antennæ remarkably short and stout, 5-articulate, with the 2nd joint considerably dilated and divided anteriorly into 2 sharply-defined setiferous lobes. Posterior antennæ with the outer ramus rather small, not nearly attaining the length of the 1st joint of the inner, and biarticulate. Oral parts normal. Natatory legs moderately slender, inner ramus in 1st pair considerably longer than the outer, in the remaining pairs of about same length. Last pair of legs well developed, and somewhat resembling in structure those in *P. leptognatha*, the distal joint being oval in form, with the terminal lobes short and rather unequal, the outermost one placed far in front of the other two, marginal setæ rather slender, the middle one the longest; appendicular bristle attached close to the base of the joint and accompanied by a transverse row of small spinules; inner expansion of proximal joint extending somewhat beyond the middle of the distal joint, apical setæ very unequal, the outer one being scarcely half as long as the inner.

Male, as usual, smaller than female and of still more slender form. Anterior antennæ very distinctly hinged and composed of 6 well defined joints, the 4th of which is considerably tumefied and provided outside, at some distance from the base, with a large sausage-shaped æsthetask. Last pair of legs, as usual, much smaller than in female.

Colour of the living animal not yet ascertained.

Length of adult female 0.74 mm.

Remarks.—The above-described species is easily recognised by the slender subfusiform shape of the body in both sexes, and the unusually short and stout anterior antennæ. Some differences from the preceding species are also found in the other structural details, as pointed out in the above diagnosis.

Occurrence.—Solitary specimens of this elegant species have been taken in 3 different places on the southern coast of Norway, viz., at Risør, Flekkero and Korshavn. It occurred in depths ranging from 20 to 60 fathoms.

26. *Pseudobradia tenella*, G. O. Sars, n. sp.
(Pl. XXIII, fig. 1).

Specific Characters.—*Female*. Body comparatively slender and narrow, subfusiform in shape, with rather thin and pellucid integuments. Cephalic segment considerably longer than the exposed part of the trunk and abruptly

contracted in front; rostral plate rather prominent and, seen from above, narrowly truncated at the end. Urosome about equalling in length $\frac{2}{3}$ of the anterior division, and gradually tapered behind; genital segment much larger than the succeeding one; anal segment, as usual, the smallest and very slightly incised behind in the middle. Caudal rami comparatively short, being scarcely longer than they are broad; apical setæ rather slender and elongated. Anterior antennæ of moderate size and 6-articulate. Posterior antennæ with the outer ramus nearly as long as the inner and biarticulate, 1st joint very small, distal joint somewhat curved and provided inside with a row of slender spinules. Oral parts and natatory legs of the usual structure. Last pair of legs comparatively short, with the distal joint broadly quadrangular in form and having the terminal lobes densely spinulose and nearly equal, marginal setæ unusually short; appendicular bristle attached close to the base of the joint and accompanied inside by 4 small spinules; inner expansion of proximal joint extending almost as far as the distal joint, and provided across the middle with a row of delicate spinules, inner edge coarsely ciliated, apical setæ, as usual, rather unequal in length.

Colour of the living animal not yet ascertained.

Length of adult female 0.63 mm.

Remarks.—This is a much smaller species than any of the 3 preceding ones, and is moreover easily distinguished by the shape of the rostral plate and the structure of the last pair of legs. The specific name here proposed alludes to the very thin and pellucid integuments and the comparatively slender form of the body.

Occurrence.—Some few specimens of this form, all of the female sex, were picked up from samples taken partly at Risør, partly at Korshavn, the depth ranging from 20 to 60 fathoms.

27. *Pseudobradia parvula*, G. O. Sars, n. sp.

(Pl. XXIII, fig. 2).

Specific Characters.—*Female.* Body comparatively short and stout, with the anterior division somewhat dilated in the middle. Cephalic segment occupying about half the length of that division, and abruptly contracted in front; rostral plate less prominent than in the preceding species and, seen from above, obtusely truncated at the end. Urosome only slightly exceeding in length the exposed part of the trunk and not much narrowed behind; genital segment, as usual, the largest and nearly equalling in length the 2 suc-

ceeding segments combined; anal segment shorter than any of the preceding ones, and broadly emarginated behind in the middle. Caudal rami comparatively small, being scarcely longer than they are broad; apical setæ rather slender. Anterior antennæ comparatively shorter than in the preceding species, and only composed of 5 joints. Posterior antennæ with the outer ramus somewhat shorter than the inner and very narrow, being composed of 3 joints, the first 2 very small. Anterior lip with a very conspicuous, almost rectangular protuberance in front. The other oral parts, as also the natatory legs, of normal structure. Last pair of legs comparatively small; distal joint narrow quadrangular in form and divided at the end into 3 well-defined and nearly equal lobes without any spinulose clothing, marginal setæ rather slender and exhibiting the usual relation in length; appendicular bristle attached at some distance from the base of the joint and accompanied outside by a small spinule; inner expansion of proximal joint somewhat curved and not extending as far as the distal joint, apical setæ, as usual, rather unequal in length.

Colour of the living animal not yet ascertained.

Length of adult female 0.56 mm.

Remarks.—This species is of still smaller size than the preceding one, from which it moreover at once is distinguished by the much shorter and stouter body. The shape of the anterior lip and that of the last pair of legs are also rather different.

Occurrence.—Some few specimens of this form, all of the female sex, were obtained from samples taken at Risør and Korshavn from depths ranging from 30 to 60 fathoms.

28. *Pseudobradya pulchella*, G. O. Sars, n. sp.

(Pl. XXIV, fig. 1).

Specific Characters.—*Female.* Body comparatively short, subfusiform in shape, with the anterior division conspicuously dilated in the middle. Integuments rather firm and very glossy. Cephalic segment exceeding in length the exposed part of the trunk, and gradually narrowed in front; rostral plate not much prominent and, seen from above, obtusely rounded at the tip. Urosome slightly exceeding half the length of the anterior division and rapidly tapered behind; genital segment about the length of the 2 succeeding segments combined; anal segment small and narrowly incised behind in the middle. Caudal rami quadrangular in form, and scarcely longer than they are broad, each with a well-marked keel along the dorsal face; apical setæ of moderate length.

Anterior antennæ composed of 7 well defined joints, the 1st of which is much the largest, and exhibiting a very conspicuous patch of a dark pigment. Posterior antennæ with the outer ramus comparatively small, scarcely exceeding in length the 1st joint of the inner, though composed of 3 well defined joints. Oral parts somewhat more fully developed than in most other species of the present genus. 1st pair of natatory legs with the spine attached outside the 2nd basal joint remarkably strong and quite smooth, inner ramus of this pair considerably larger than the outer. Last pair of legs of moderate size; distal joint somewhat spatulate in form, with the terminal lobes well defined and nearly equal, inner edge of the joint distinctly ciliated; marginal setæ moderately slender and exhibiting the usual relation in length; appendicular bristle attached about in the middle of the joint and accompanied inside by 4 slender spinules; inner expansion of proximal joint comparatively short, not extending to the middle of the distal joint, and exhibiting at the base a transverse row of small spinules, inner edge distinctly ciliated, apical setæ rather unequal, the outer one scarcely exceeding half the length of the inner. Ovisac comparatively small.

Colour of preserved specimens dark corneous.

Length of adult female 0.55 mm.

Remarks.—The present species is easily recognised from those described in the preceding pages, and is especially distinguished by the dark corneous and glossy integuments and by the very conspicuous dark pigmentary patch on the base of the anterior antennæ. In the latter respect it agrees with *P. minor* of Scott, which however otherwise is rather different.

Occurrence.—Two female specimens of this handsome species were picked up from a sample taken at Risør from a depth of about 40 fathoms.

29. *Pseudobradya exilis*, G. O. Sars, n. sp.

(Pl. XXIV, fig. 2).

Specific Characters.—*Female.* Body exceedingly slender and narrow, with the anterior division scarcely at all dilated in the middle. Cephalic segment exceeding in length the exposed part of the trunk and rapidly tapered in front; rostral plate strongly prominent and acuminate at the end. Urosome slightly exceeding half the length of the anterior division and considerably tapered behind; genital segment fully as long as the 2 succeeding segments combined; anal segment very small and scarcely incised behind in the middle. Caudal rami short, about as long as they are broad, and rather approximate; apical setæ very slender. Anterior antennæ comparatively small, 6-articulate.

Posterior antennæ with the outer ramus unusually fully developed, exceeding considerably in length the inner, and composed of 3 well defined joints, the middle one the smallest, apical spines rather elongated and coarsely spinulose at the one edge. Posterior maxillipeds of simpler structure than in the other species, being only composed of 2 joints, the distal one the longer and carrying at the tip 2 unequal setæ. The remaining oral parts apparently normal. Natatory legs powerfully developed, with the basal part thick and muscular, rami comparatively slender. Last pair of legs rather unlike in shape those in the other known species, the distal joint being considerably produced, with the outer part narrow sublinear in form and distinctly ciliated inside, outermost lobe far remote from the other 2 and occurring near the base of the joint; marginal setæ comparatively slender, the middle one being, as usual, the longest; appendicular bristle attached close to the base of the joint and accompanied by a transverse row of small spinules; inner expansion of proximal joint rather produced, extending beyond the middle of the distal joint and distinctly ciliated inside, apical setæ slender and somewhat unequal in length.

Colour of the living animal not yet ascertained.

Length of adult female 0.50 mm.

Remarks.—This is a very distinct and easily recognisable species, especially distinguished by the unusually large size of the outer ramus of the posterior antennæ and the peculiar shape of the last pair of legs. The structure of the posterior maxillipeds also is rather unlike that found in the other species of the present genus.

Occurrence.—A solitary female specimen only of this interesting species has as yet come under my notice. It was found in a sample taken, many years ago, at Bejan, outside the Trondhjem Fjord, from a depth of about 30 fathoms.

* 30. *Pseudobradia pygmæa*, G. O. Sars, n. sp.

(Pl. XXIV, fig. 3).

Specific Characters.—*Female.* Body moderately slender and of the usual subfusiform shape. Cephalic segment about occupying half the length of the anterior division and gradually tapered in front; rostral plate not much prominent and acute at the tip. Urosome about equalling in length $\frac{2}{3}$ of the anterior division and rapidly tapered behind; genital segment comparatively large, equalling in length the 2 succeeding segments combined. Caudal rami scarcely longer than the anal segment; apical setæ rather slender. Anterior antennæ short and stout, 6-articulate. Posterior antennæ with the outer ramus

comparatively small, scarcely longer than the 1st joint of the inner, and biarticulate. Oral parts and natatory legs of normal structure. Last pair of legs with the distal joint oval in form and quite smooth, terminal lobes somewhat unequal, the outermost one being placed a little in front of the other 2, which are closely juxtaposed, marginal setæ rather slender and exhibiting the usual relation in length; appendicular bristle attached close to the base of the joint and not accompanied by any spinules; inner expansion of proximal joint extending a little beyond the middle of the distal joint and quite smooth inside, apical setæ of the usual appearance. Ovisac comparatively small.

Colour of the living animal not yet ascertained.

Length of adult female 0.42 mm.

Remarks.—This is the smallest of the known species of the present genus and perhaps also of the whole family *Ectinosomidae*, and may thereby easily be recognized, though not exhibiting any more prominent peculiarity in its structure.

Occurrence.—Of this dwarfed species also only a solitary female specimen has hitherto come under my notice. It was found in a sample taken at Farsund, south coast of Norway, from a depth of about 30 fathoms.

31. *Pseudobradya ambigua*, G. O. Sars, n. sp.

(Pl. XXV).

Specific Characters.—*Female.* Body of a rather robust appearance, with the anterior division not at all broader than the posterior and gradually attenuated anteriorly. Cephalic segment exceeding somewhat in length the exposed part of the trunk and greatly contracted in front, terminating in a strongly prominent rostral projection acuminate at the tip. Trunkal segments of about equal size, with the epimeral plates well developed and acutangular behind, each segment exhibiting a transverse row of small spinules in the middle of the back. Urosome unusually massive, equalling in length about $\frac{3}{4}$ of the anterior division and, seen from above, only slightly narrowed behind, its segments successively diminishing in size and fringed behind with slender and delicate spinules; anal segment rather short and somewhat flattened, projecting behind in the middle into 2 juxtaposed acuminate lappets. Caudal rami very short, being considerably broader than they are long; apical setæ not much elongated, but rather strong. Anterior antennæ very small, 5-articulate. Posterior antennæ with the inner ramus normally developed; outer ramus comparatively small, 3-articulate, and, as in most other species, very narrow

linear in form, being however not, as usual, attached to the posterior distal corner of the basal part, but to a quadrangular piece firmly connected with the anterior corner and armed below with 2 strong, coarsely spinulose setæ curving downwards in front of the inner ramus. Oral parts very small and scarcely extending beyond the edges of the epimeral plates, being however apparently built on the type characteristic of the present genus. Posterior maxillipeds distinctly 3-articulate, with the middle joint comparatively broad, sub-lamellar, and densely spinulose inside, last joint provided with 4 somewhat unequal setæ. Natatory legs well developed, with the basal part comparatively broad and muscular, rami rather slender, the inner one being in 1st pair somewhat longer than the outer, in the remaining pairs of about same length. Last pair of legs broad, foliaceous, and closely contiguous along the middle; distal joint oval in form, with the terminal lobes somewhat unequal, the outermost one occurring rather in front of the other 2; marginal setæ very strong and coarsely ciliated, the 2 outermost ones distinctly defined at the base, whereas the innermost one forms the immediate continuation of the joint; appendicular bristle well developed and attached near the base of the joint; inner expansion of proximal joint quite short, but rather broad, with both setæ remarkably strong and not defined by any suture at the base.

Male nearly of same size as female and very like it in its outward appearance, though having the urosome, as usual, distinctly 5-articulate. Anterior antennæ much larger than in female, and distinctly hinged, with the 3rd joint considerably enlarged and provided outside, at some distance from the base, with a large sausage-shaped æsthetask extending backwards along the side of the cephalic segment. 2nd pair of legs with the inner ramus slightly transformed, being comparatively longer than in female, with the terminal joint narrowly produced and quite smooth on both edges, tip carrying a short, somewhat flexuous spine and a slender seta. Last pair of legs much smaller than in female, with the marginale setæ shorter and all of them distinctly defined at the base.

Colour of the living animal not yet ascertained.

Length of adult female 0.82 mm.

Remarks.—This is a rather anomalous species, distinguished both by the peculiar outward appearance of the body and by the structure of some of the appendages. Especially is the structure of the posterior antennæ very peculiar and unlike that found in any of the other known species.

Occurrence.—3 specimens of this remarkable form, 2 females and 1 male, have been examined by me. One of the female specimens was taken,

many years ago, at Selven, Trondhjem Fjord, from a depth of about 7 fathoms; the other 2 were picked up from a sample taken at Korshavn, south coast of Norway, from a considerably greater depth, viz., 50 fathoms.

Gen. **Bradya**, Boeck.

Remarks.—In the restriction here adopted, only 3 species of this genus have hitherto been recorded, viz., *B. typica* Boeck, *B. dilatata* G. O. Sars, and *B. armigera* (Scott). I am now enabled to add 5 new species, to be described in the sequel, increasing the number of Norwegian species to 8 in all.

32. **Bradya Scotti**, G. O. Sars, n. sp.

(Pl. XXVI).

Specific Characters.—*Female.* Body resembling in shape that of *B. typica*, though comparatively somewhat more robust, with the anterior division more tumid. Cephalic segment equalling about in length the exposed part of the trunk, and only slightly contracted in front; rostral plate somewhat deflexed and, seen from above, obtusely rounded at the end. Epimeral plates of the 3 succeeding segments well developed and acutangular behind. Last trunkal segment comparatively small and without any distinct epimeral plates. Urosome considerably narrower than the anterior division and exceeding somewhat half its length; genital segment about equalling in length the 2 succeeding segments combined; anal segment much the smallest and only slightly incised behind in the middle. Caudal rami about the length of the anal segment and somewhat divergent; apical setæ moderately slender. Antennæ, oral parts, and natatory legs of a structure very similar to that in *B. typica*. Last pair of legs, however, exhibiting some well-marked differences; distal joint comparatively larger and more regularly quadrangular in form, with the innermost marginal seta considerably shorter than the middle one; appendicular bristle well developed and attached at some distance from the base of the joint; inner expansion of proximal joint comparatively narrower than in *B. typica*, with the apical setæ very unequal, the inner one much stronger than the outer and nearly 3 times as long.

Colour of the living animal not yet ascertained.

Length of adult female 0.88 mm.

Remarks.—The present species is closely allied to *B. typica* and about of same size, but of somewhat more robust form of the body, and more particularly distinguished by the shape of the last pair of legs and the rather different mutual relation of the setæ attached to the distal joint of that pair. According to the figures of these legs given by Brady and Scott, it would seem that the British form recorded as *B. typica* Boeck is more properly referable to the present species.

Occurrence.—Specimens of this form have been obtained at Risør together with the typical species, and it is very probable that on a closer investigation it also will be found to occur in many other places on the Norwegian coast.

33. *Bradya macrochæta*, G. O. Sars, n. sp.

(Pl. XXVII, fig. 1).

Specific Characters.—*Female.* Body exhibiting the usual somewhat obpyriform shape, the anterior division being considerably broader than the posterior, with the greatest width somewhat in front of the middle. Cephalic segment comparatively large, exceeding in length the exposed part of the trunk, and only slightly contracted in front; rostral plate strongly deflexed. Epimeral plates of the 3 succeeding segments bluntly angular behind. Urosome but little exceeding half the length of the anterior division, and gradually tapered behind; genital segment fully as large as the 2 succeeding segments combined; anal segment, as usual, the smallest and slightly incised behind in the middle. Caudal rami about the length of the anal segment and somewhat divergent; apical setæ very slender. Antennæ, oral parts, and natatory legs of quite normal structure. Last pair of legs, however, distinguished by the excessive length of the marginal setæ, some of them extending almost to the end of the tail; distal joint of those legs comparatively small, with the middle seta the longest; inner expansion of proximal joint not much produced, but with the apical setæ very slender and elongated, the inner one nearly attaining the length of the middle seta of the distal joint.

Colour pale whitish grey.

Length of adult female 0.60 mm.

Remarks.—The present species is of much smaller size than the preceding one, and may moreover at once be distinguished both from this and the other known species by the excessive length of the setæ clothing the last pair of legs, a character which indeed has given rise to the specific name here proposed.

Occurrence.—Some few specimens of this form, all of the female sex, were obtained some years ago at Risør in depths ranging from 50 to 100 fathoms, muddy bottom.

34. *Bradya furcata*, G. O. Sars, n. sp.

(Pl. XXVII, fig. 2).

Specific Characters.—*Female.* Body comparatively short and stout, with the anterior division regularly elliptical in outline, the greatest width occurring about in the middle. Cephalic segment about the length of the exposed part of the trunk, and conspicuously contracted in its anterior part, with the extremity, seen from above, narrowly truncated; rostral plate rather deflexed. Urosome much narrower than the anterior division and about equalling $\frac{2}{3}$ of its length, tapering rapidly behind, posterior edges of the segments distinctly spinulose. Caudal rami unusually produced, attaining the length of the last 2 segments combined, and rather divergent; apical setæ moderately slender. Anterior antennæ short and stout, 6-articulate. Posterior antennæ and oral parts normal. Natatory legs with the rami rather unequal, the inner one being much the longer, middle joint of this ramus fully as large as the terminal one, and in the 2nd pair armed inside with a strong spine in addition to the usual seta. Last pair of legs somewhat unlike those in the other species, the distal joint being comparatively large and rounded oval in form, with both the innermost and outermost setæ very short; inner expansion of proximal joint extending beyond the middle of the distal joint, and having the 2 apical setæ of nearly equal length.

Body rather pellucid and of a whitish grey colour.

Length of adult female 0.64 mm.

Remarks.—This is a well defined species, and may at once be recognised by the unusually long and narrow caudal rami, a character which indeed has given rise to the specific name here proposed. It also exhibits some well-marked differences from the other species in the structural details, especially as regards the structure of the last pair of legs.

Occurrence.—Two female specimens only of this form have as yet come under my notice. They were taken at Risør from a depth of about 60 fathoms.

35. *Bradya congenera*, G. O. Sars, n. sp.

(Pl. XXVIII, fig. 1).

Specific Characters.—Female. Body of the usual obpyriform shape, the anterior division being somewhat broader in front than behind. Cephalic segment about the length of the exposed part of the trunk, and slightly contracted at the anterior extremity, with the front, seen from above, obtusely truncated; rostral plate rather deflexed. Urosome somewhat exceeding half the length of the anterior division, and gradually tapered behind; genital segment fully as long as the 2 succeeding segments combined; anal segment, as usual, the smallest, though not much shorter than the preceding segment, and broadly emarginated behind in the middle. Caudal rami comparatively short, not nearly attaining the length of the anal segment and somewhat divergent; apical setæ very slender. Anterior antennæ of moderate size and composed of 8 well defined joints. Posterior antennæ, oral parts, and natatory legs resembling in structure those parts in *B. typica*. Last pair of legs likewise very similar, the mutual relation in length of the setæ attached to the distal joint being the very same. Ovisac comparatively small.

Body of the usual whitish grey colour.

Length of adult female scarcely exceeding 0.67 mm.

Remarks.—The present form is closely allied to *B. typica*, exhibiting a very similar structure of the several appendages. It is however of much smaller size, and may, on a closer examination, be distinguished by the comparatively shorter caudal rami and the distinctly 8-articulate anterior antennæ.

Occurrence.—Several specimens of this form have been collected at Risør together with the other species, and it probably also occurs in many other places of the Norwegian coast. As however its specific difference from *B. typica* has not formerly been recognised, the exact localities cannot at present be stated.

36. *Bradya simulans*, G. O. Sars, n. sp.

(Pl. XXVIII, fig. 2).

Specific Characters.—Female. Body resembling in shape that of *B. furcata*, being rather short and stout, with the anterior division elliptical in outline. Cephalic segment comparatively large, exceeding somewhat in length the exposed part of the trunk, and gradually contracted anteriorly, with the front, seen from above, narrowly rounded; rostral plate small, deflexed. Urosome about equalling in length $\frac{2}{3}$ of the anterior division and rapidly

tapered behind; genital segment, as usual, much the largest; anal segment deeply incised behind in the middle. Caudal rami somewhat produced, exceeding in length the anal segment, and rather divergent; apical setæ moderately slender. Anterior antennæ comparatively smaller than in the preceding species and only composed of 6 joints. Posterior antennæ, oral parts, and natatory legs exhibiting the usual structure. Last pair of legs likewise quite normally developed; distal joint of moderate size and quadrangular in form, with the marginal setæ rather unequal, the middle one being much the longest, the outermost the smallest; inner expansion of proximal joint not much produced, and having the apical setæ moderately slender and rather unequal. Ovisac comparatively small.

Colour whitish grey.

Length of adult female 0.61 mm.

Remarks.—The present species exhibits in the general shape of the body a perplexing resemblance to *B. furcata*, and may at the first sight easily be confounded with that species. On a closer examination, it is however found to differ in the somewhat less produced caudal rami, as also in the structure of some of the appendages, especially that of the last pair of legs.

Occurrence.—One or two specimens only of this form have as yet come under my notice. They were taken at Risør in a depth of about 60 fathoms, muddy sand.

Gen. *Halophytophilus*, A. Brian, 1918.

Generic Characters.—Body somewhat resembling in its general shape that in the genus *Bradya*, though having the two chief divisions less sharply marked off from each other. Cephalic segment produced in front to a strongly chitinised recurved rostrum. Urosome very slender and attenuated. Anterior antennæ comparatively strong, 6-articulate, with the terminal joint unusually prolonged. Posterior antennæ with the outer ramus very small, inner one well developed, with the distal joint coarsely spinous. Mandibles with the masticatory part narrowly exerted, palp comparatively large, though having the rami short and stout. Maxillæ not examined. Anterior maxillipeds with the 2nd basal joint remarkably long and narrow, forming with the 1st a sharp genicular bend. Posterior maxillipeds apparently 4-articulate, with the penultimate joint rounded and fringed with ciliated setæ, terminal joint armed at the tip with claw-shaped spines. 1st pair of legs with the inner ramus sub-pre-

hensile and only composed of 2 unequal joints; rami of the succeeding 3 pairs normal. Last pair of legs comparatively large, foliaceous, resembling in structure those in the genus *Pseudobradya*.

Remarks.—This genus has been recently established by Dr. A. Brian, to include a small Ectinosomid found by him among marine littoral algæ growing near the zoological laboratory of "Quarto dei Mille", Ligurian coast. As observed by that author, the most essential distinguishing character of this genus is derived from the structure of the 1st pair of legs, the inner ramus of which is peculiarly transformed and very unlike that found in any other form of the Ectinosomidæ, being only composed of 2 joints and apparently prehensile in character. Otherwise the genus seems to approach that of *Pseudobradya*. A well-marked Norwegian species of this interesting genus will be described below.

37. *Halophytophilus spinicornis*, G. O. Sars, n. sp.
(Pl. XXIX).

Specific Characters.—*Female.* Body rather slender, broadest in front and gradually attenuated behind, with no sharp demarcation between the anterior and posterior divisions. Cephalic segment not fully attaining the length of the exposed part of the trunk and, seen from above, obtusely rounded in front; rostrum very coarse, acuminate, and curved downwards. The 3 succeeding segments each with a transverse row of small spinules across the middle of the back, epimeral plates well developed and obtusangular behind. Last trunkal segment only slightly smaller than the preceding one. Urosome somewhat exceeding in length $\frac{2}{3}$ of the anterior division, and rapidly tapered behind; genital segment rather large, though not fully attaining the length of the 2 succeeding segments combined; anal segment very small and only slightly incised behind in the middle. Caudal rami about the length of the anal segment and not at all divergent, each with a well-marked keel along the dorsal face; apical setæ very slender. Anterior antennæ of moderate size and composed of 6 well defined joints rapidly diminishing in width distally and clothed with strong curved setæ; 2nd joint armed, in addition to the setæ, at the end with a very strong thickish spine; last joint very narrow and about the length of the 2 preceding joints combined. Posterior antennæ very strongly built, with the terminal part (inner ramus) scarcely longer than the basal part, its distal joint armed along the anterior edge with 4 coarse thickish spines, apical setæ 5 in number; outer ramus small, biarticulate with 2 slender setæ at the

tip. 1st pair of legs with the outer ramus normally developed, inner ramus of about equal length, but very different in structure, being only composed of 2 joints, the proximal one much the larger and somewhat lamellar, with a very long deflexed seta inside near the end; distal joint about half the length of the proximal one and much narrower, carrying at the tip a slender somewhat claw-like spine accompanied inside by 2 elongated setæ, inner edge provided, at some distance from the end, with a much shorter seta. The 3 succeeding pairs with both rami 3-articulate and sub-equal in length. Last pair of legs comparatively large, with the distal joint rather regularly oval in form and nearly smooth, terminal lobes well defined and slightly unequal; marginal setæ moderately slender and exhibiting the usual relation in length; appendicular bristle well developed, and attached at some distance from the base of the joint, being accompanied outside by a single small spinule; inner expansion of proximal joint rather narrow, and extending about to the middle of the distal joint; apical setæ slender and somewhat unequal in length.

Colour of the living animal not yet ascertained.

Length of adult female 0.67 mm.

Remarks.—The above-described form is evidently referable to the genus *Halophytophilus*¹⁾ of Brian, exhibiting a quite analogous structure of the 1st pair of legs. It is however quite certainly specifically different from the typical form, *H. fusiformis* Brian, being of much larger size, and moreover differing in the very conspicuous spinous armature of both antennæ, as also in the relative length of the 2 joints composing the inner ramus of the 1st pair of legs, and in the number of setæ attached to the distal joint of that ramus.

Occurrence.—A solitary female specimen only of this anomalous form has as yet come under my notice. It was found in a sample taken last summer at Hvalør, outside the Christiania Fjord, from a depth of about 10 fathoms, muddy bottom.

¹⁾ The aspiration of the first component of the name (*Allo*) has erroneously been omitted by that author (*Alophytophilus*).

Fam. Harpacticidæ.

Gen. *Harpacticus*, M. Edwards.

38. *Harpacticus tenellus*, G. O. Sars, n. sp.

(Pl. XXX).

Specific Characters.—Female. Body resembling in shape that of *H. gracilis* Claus, but of somewhat smaller size and more delicate structure, with rather thin and pellucid integuments. Anterior division slightly depressed and oblong oval in outline, being rather sharply marked off from the comparatively small urosome. Cephalic segment about the length of the trunk and evenly contracted in front; rostral plate somewhat prominent and obtusely rounded at the tip. Urosome not nearly attaining half the length of the anterior division and much narrower; genital segment comparatively large, occupying about half the length of the urosome. Caudal rami short, quadrangular, scarcely as long as they are broad; apical setæ much elongated. Anterior antennæ very slender, attaining almost the length of the cephalic segment, and composed of 9 joints, the 3rd and 4th of which are rather narrow and elongated, subequal in size; terminal part, composed of the 5 outermost joints, scarcely longer than the preceding (4th) joint. Posterior antennæ resembling those in *H. gracilis*, but of a more delicate structure. Posterior maxillipeds with the basal part much elongated and narrowed distally, hand less dilated than in the said species, being about twice as long as it is broad and somewhat curved, palmar edge well defined and armed, at some distance from the end, with a very conspicuous spiniform process curving upwards along the edge. 1st pair of legs built on the same type as in *H. gracilis*, but of more delicate structure, with the rami comparatively narrower, the inner one about the length of the 1st joint of the outer. Natatory legs of the usual structure. Last pair of legs with the distal joint oblong oval in form and comparatively narrower than in *H. gracilis*; inner expansion of proximal joint less produced. Ovisac large, rounded oval in form.

Male fully as large as female and exhibiting the usual rather strongly marked sexual differences. Anterior antennæ conspicuously hinged, though far less robust than in *H. gracilis*. Posterior maxillipeds scarcely more powerful than in female. 2nd and 3rd pairs of legs transformed in a much similar manner to that in *H. gracilis*. Last pair of legs much reduced in size, with the proximal joint very small and not at all expanded inside.

Body in both sexes rather pellucid, of an uniform whitish grey colour, without any obvious pigment.

Length of adult female 0.63 mm.

Remarks.—The present species is closely allied to *H. gracilis* Claus, but of somewhat smaller size, and on the whole of a rather more delicate appearance. On a closer examination some well-marked differences are also found in the structural details, as pointed out in the above diagnosis.

Occurrence.—I have met with this species in several places both on the west and south coasts of Norway, but have formerly not been aware of its specific difference from *H. gracilis* Claus. It is only found in depths ranging from 20 to 60 fathoms, never, as is the case with *H. gracilis* and most other species of the present genus, in the littoral zone.

Fam. Idyæidæ.

Gen. *Idyæa*, Philippi (*Idya*).

39. *Idyæa graciloides*, G. O. Sars, n. sp.

(Pl. XXXI).

Specific Characters.—*Female.* Body comparatively slender, resembling somewhat in shape that of *I. gracilis* Scott. Cephalic segment about equalling in length the 3 succeeding segments combined and rather broad behind; rostral prominence very small. Epimeral plates of the 3 succeeding segments laterally expanded and closely contiguous. Last trunkal segment, as usual, very small and without any distinct epimeral plates. Urosome about equalling in length $\frac{2}{3}$ of the anterior division and much narrower; genital segment fully as long as the 3 succeeding segments combined and somewhat fusiform in outline, being conspicuously dilated in the middle. Caudal rami about as long as they are broad, and sub-quadrangular in form; apical setæ very slender, the outermost and innermost ones rather thin and considerably longer than in *I. gracilis*. Anterior antennæ slender and elongated, exceeding somewhat in length the cephalic segment, 3rd joint longer and narrower than the 2nd and about twice the length of the 4th; terminal part, composed of the 4 outermost joints, occupying about $\frac{1}{4}$ of the length of the antenna. Posterior antennæ and oral parts of the usual structure. 1st pair of legs resembling somewhat those in

I. gracilis, the distal joint of the inner ramus being very narrow, though less elongated than in that species, only slightly exceeding in length the proximal joint. The 3 succeeding pairs of legs of quite normal appearance. Last pair of legs much smaller than in *I. gracilis*, with the distal joint rather narrow, sub-linear in form, and less densely hairy, all the setæ issuing from the outermost part of the joint.

Male of nearly same size as female, but comparatively still more slender, with the urosome distinctly 5-articulate. Anterior antennæ only slightly transformed, being a little thicker than in female, with a small joint intercalated between the 3rd and 4th; hinge rather imperfect. 2nd pair of legs with none of the setæ transformed. Last pair of legs much reduced in size.

Colour of the living animal not yet ascertained.

Length of adult female 0.86 mm.

Remarks.—This form is nearest allied to *I. gracilis* Scott, but is evidently specifically distinct, differing in the comparatively less produced caudal rami, as also rather conspicuously in the structure of the anterior antennæ and the last pair of legs.

Occurrence.—Several specimens of this form were picked up from samples taken at Korshavn from a depth of about 60 fathoms, muddy sand. I have not met with it in other places on the Norwegian coast.

40. *Idyæa compacta*, G. O. Sars, n. sp.

(Pl. XXXII).

Specific Characters.—*Female*. Body unusually short and compact, with the anterior division rather broad and somewhat depressed. Cephalic segment considerably exceeding in length the exposed part of the trunk, and only very slightly contracted in front. Epimeral plates of the 3 succeeding segments considerably expanded laterally and closely contiguous, sub-imbricate. Last trunkal segment, as usual, much narrower than the preceding ones, and without any epimeral plates. Urosome unusually short, only slightly exceeding in length $\frac{1}{2}$ of the anterior division, its segments scarcely at all spinulose at the lateral corners, and densely crowded. Anal opercle rather prominent, semilunar, and coarsely denticulated at the edge. Caudal rami scarcely as long as they are broad at the base, and somewhat obliquely truncated at the end, the outer corner being the more prominent; apical setæ very slender and elongated, the innermost but one almost attaining the length of the whole body; innermost and outermost setæ much thinner than the 2 middle ones and rather prolonged; seta

of outer edge apparently wanting. Anterior antennæ comparatively short and stout, not nearly attaining the length of the cephalic segment, and gradually attenuated distally; 2nd joint much the largest, 4th joint about half the length of the 3rd; terminal part somewhat shorter than the 2 preceding joints combined. Posterior antennæ and oral parts of quite normal appearance. 1st pair of legs resembling somewhat in structure those in *I. furcata*; 2nd joint of inner ramus however comparatively shorter, not attaining the length of the 1st; apical claws of this ramus considerably longer than in *I. furcata*. Natatory legs of the usual structure. Last pair of legs of moderate size, with the distal joint oblong oval in form and comparatively broader than in *I. furcata*, edges of the joint only provided with a few scattered small spinules, apical setæ rather slender.

Colour of the living animal not yet ascertained.

Length of adult female 0.62 mm.

Remarks.—The above-described form may be easily recognised by its very short and compact body, and more particularly by the unusually poor development of the urosome. It belongs to the smaller species of the present genus.

Occurrence.—Two female specimens only of this form have as yet come under my notice. They were found in a sample taken, some years ago, at Risør from a depth of about 50 fathoms.

Gen. *Idyella*, G. O. Sars.

41. *Idyella major*, G. O. Sars, n. sp.

(Pl. XXXIII, fig. 1).

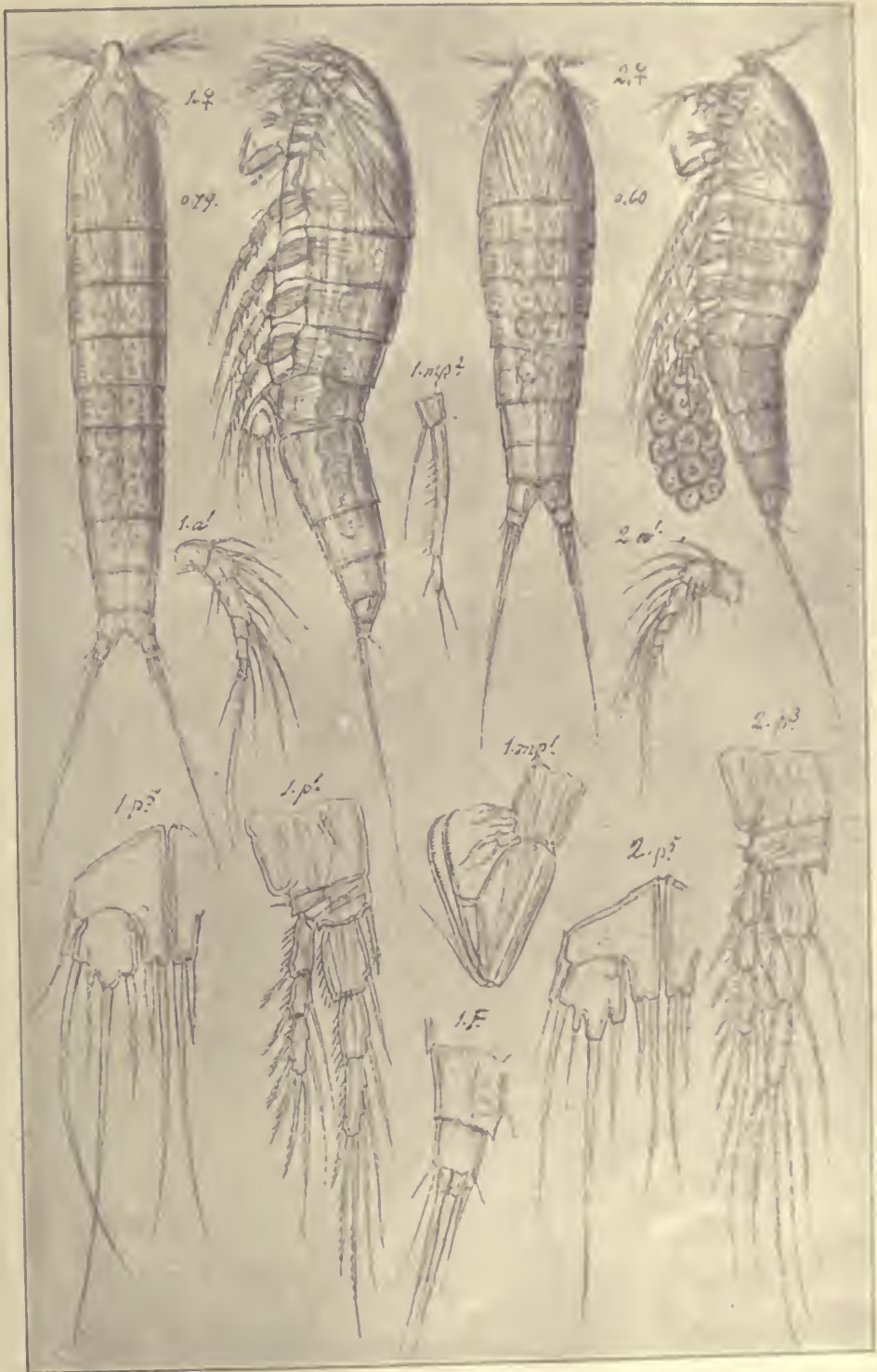
Specific Characters.—*Female.* Body rather short and stout, with the anterior division considerably dilated and somewhat vaulted dorsally. Cephalic segment very large, about as long as it is broad, and evenly rounded in front; rostral projection small and recurved. The 3 succeeding segments successively diminishing in width, and having the epimeral plates not much prominent laterally. Last trunkal segment very small. Urosome not nearly attaining half the length of the anterior division and much narrowed; genital segment comparatively large, occupying half the length of the urosome, and forming on each side a broad lamellar expansion angular behind. Caudal rami very small, quadrangular, with the apical setæ rather slender and scarcely at all divergent.

Copepoda

Suppl. Volume

Pl. XVII

Ectinosomidae



G. O. Sars, del.

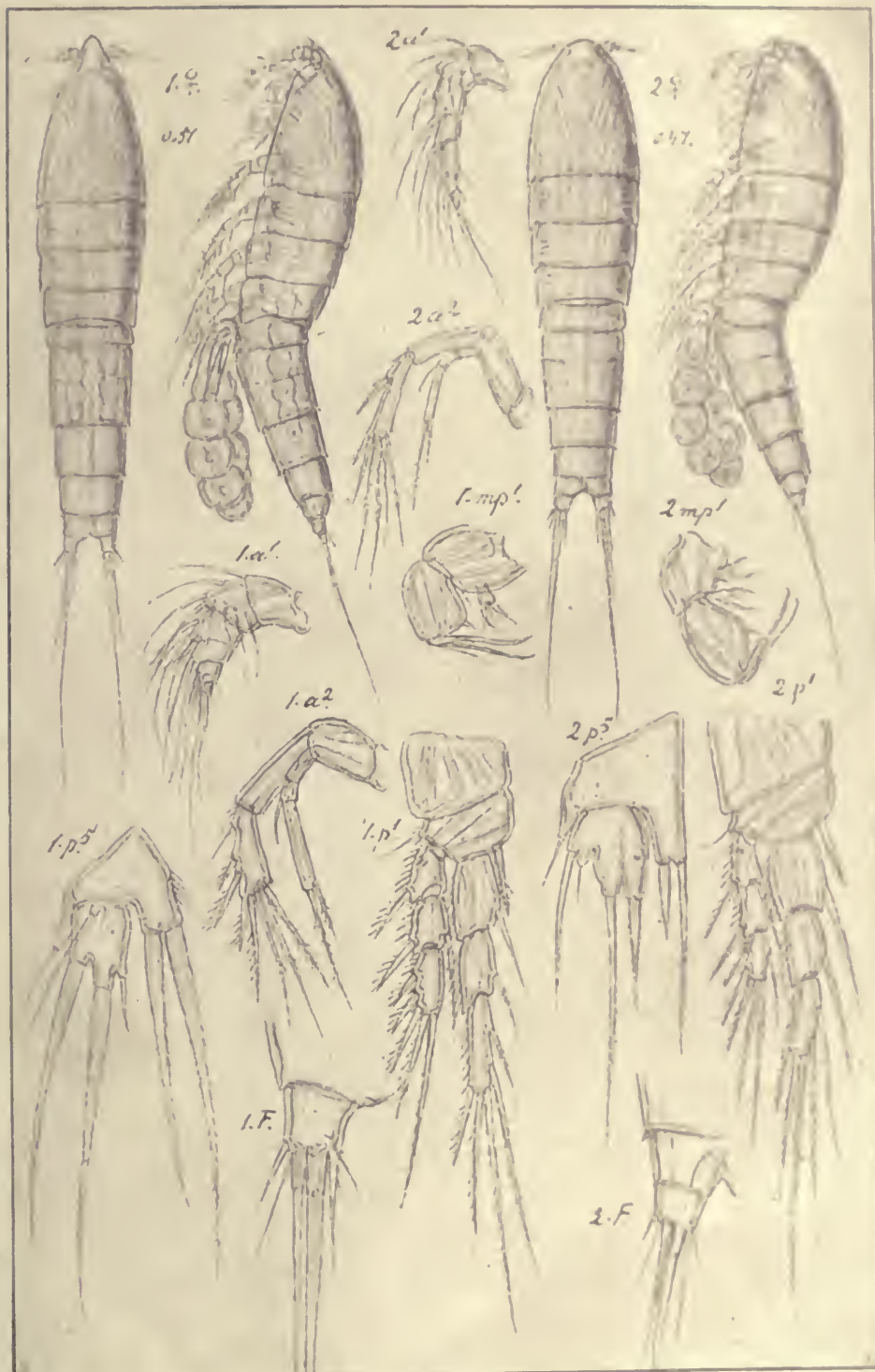
1. *Ectinosoma compressum*, G. O. Sars
2. " *tenuipes*, Scott

Copepoda

Ectinosomidae

Suppl. Volume

Pl. XVIII



G. O. Sars, del.

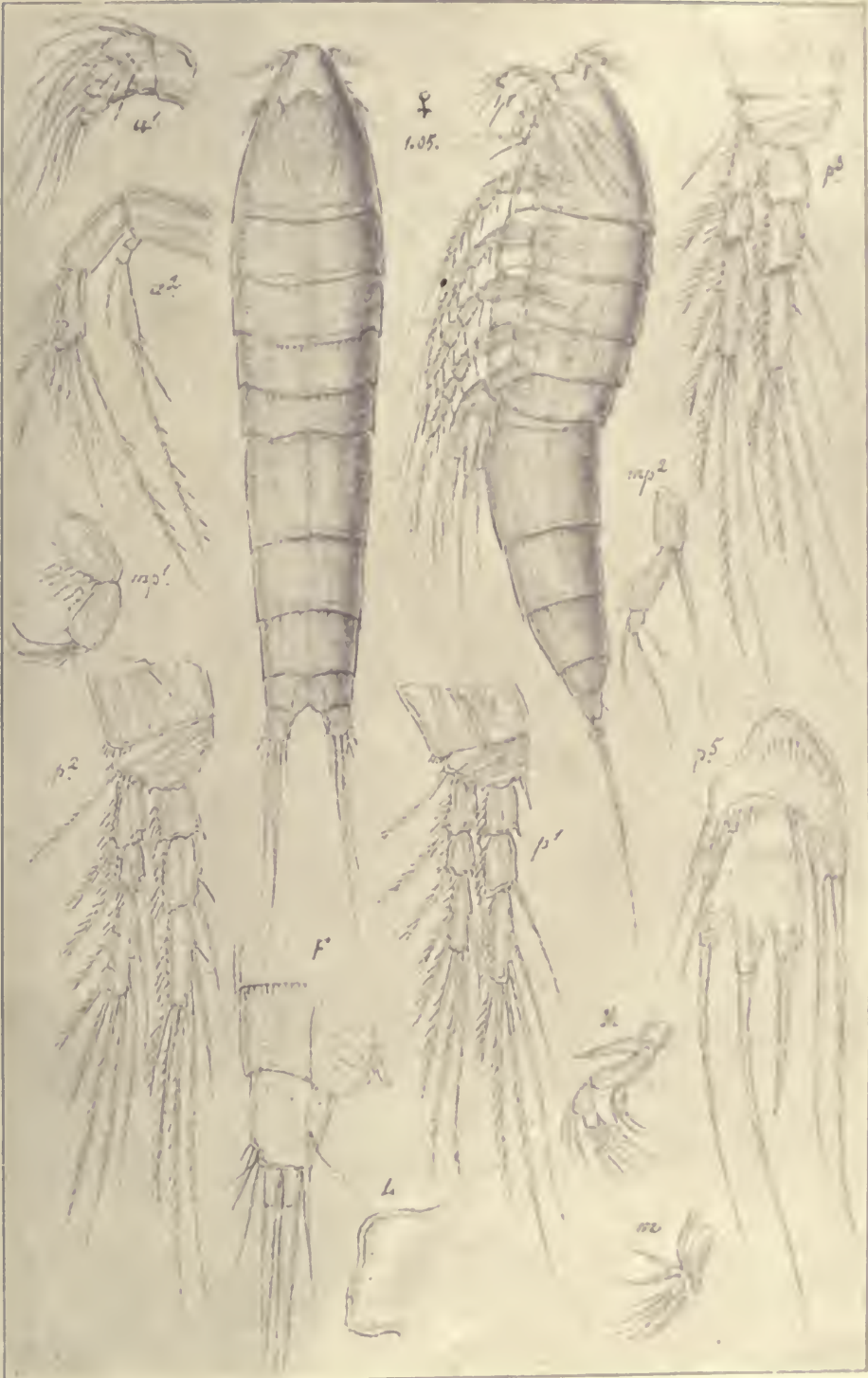
1. *Ectinosoma distinctum*, G. O. Sars
2. " *obtusum*, G. O. Sars

Copepoda

Ectinosomidae

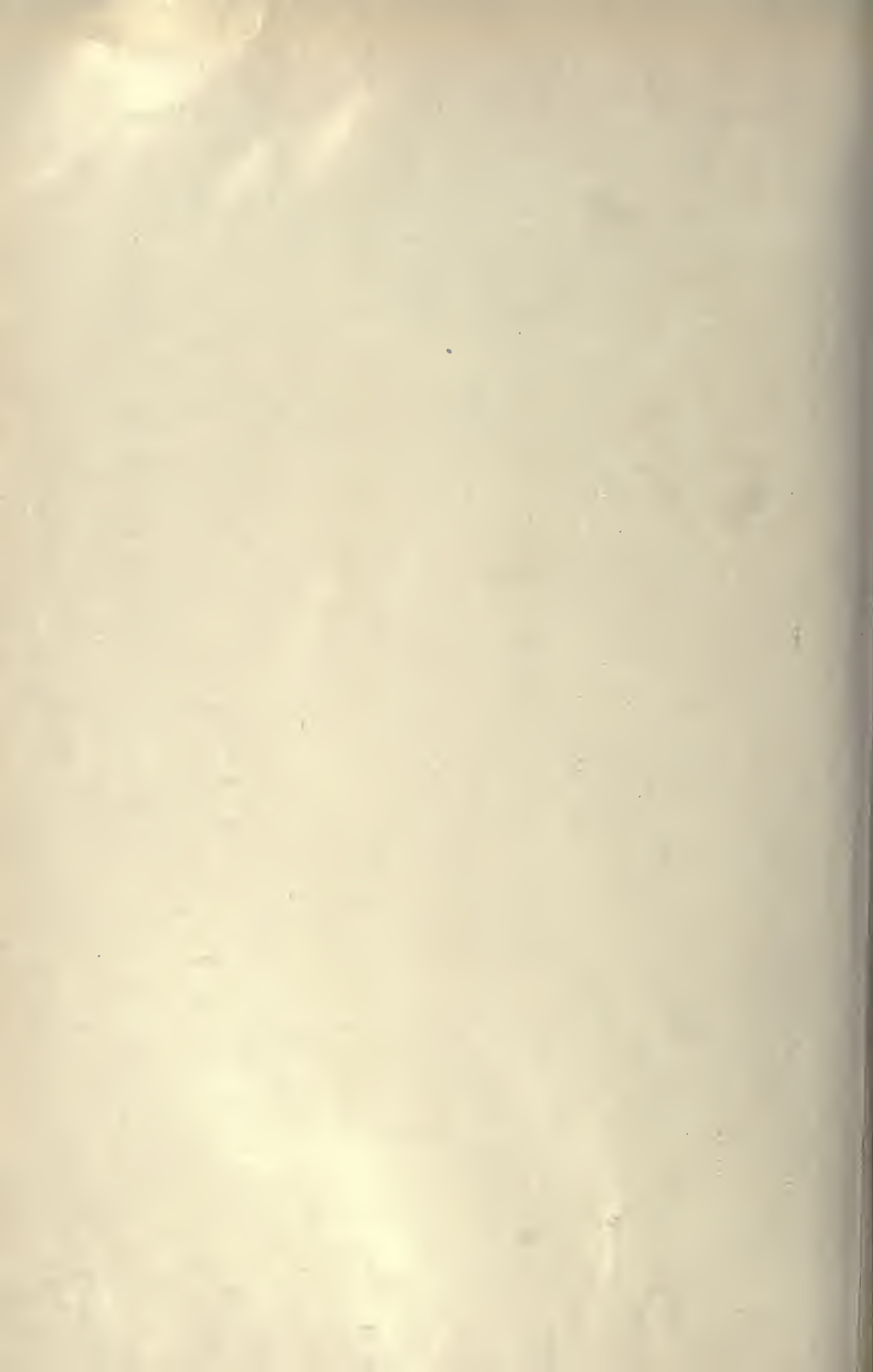
Suppl. Volume

Pl. XIX



G. O. Sars, del.

Pseudobradia digitata, G. O. Sars

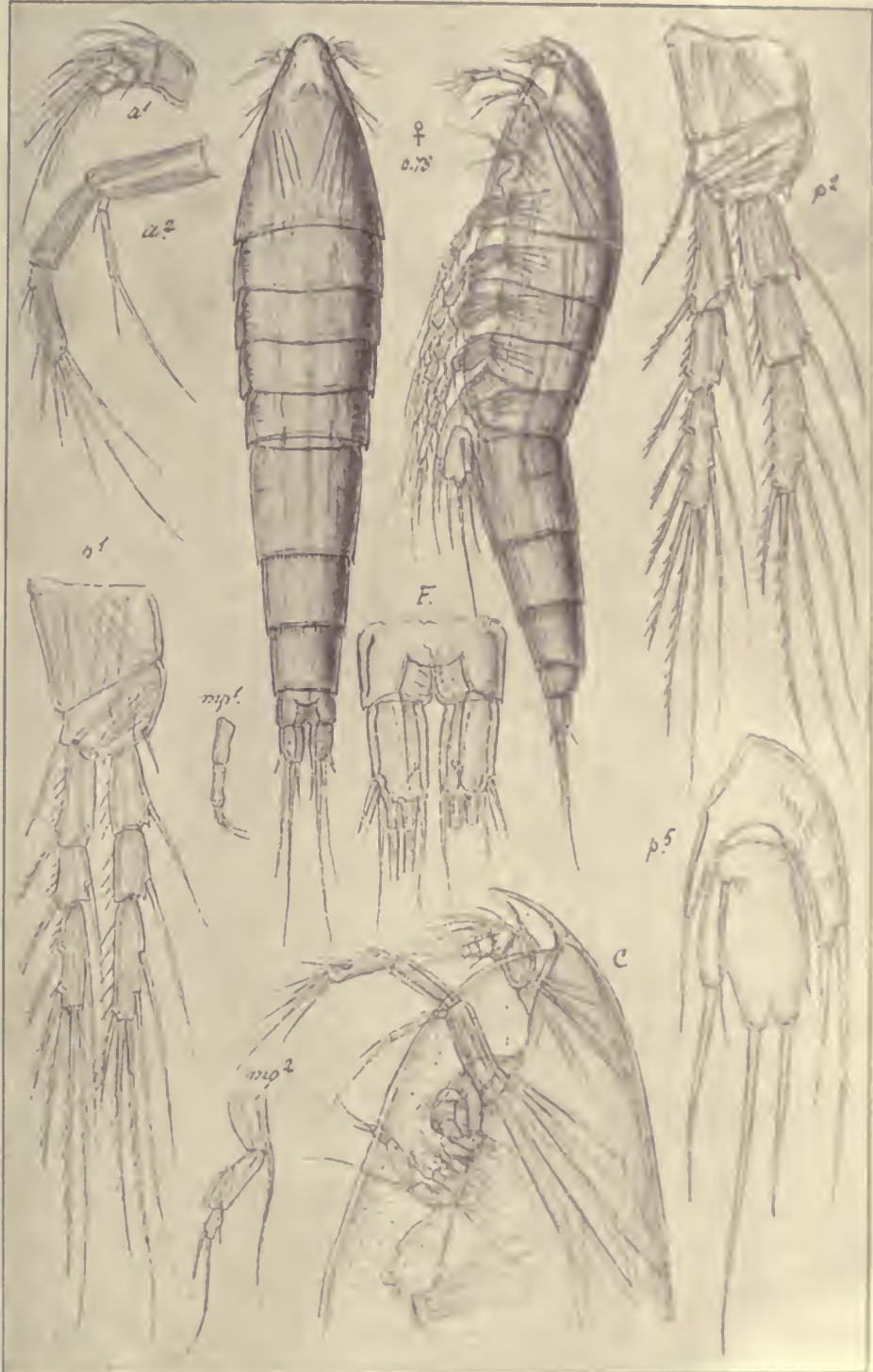


Copepoda

Ectinosomidæ

Suppl. Volume

Pl. XX



G. O. Sars, del.

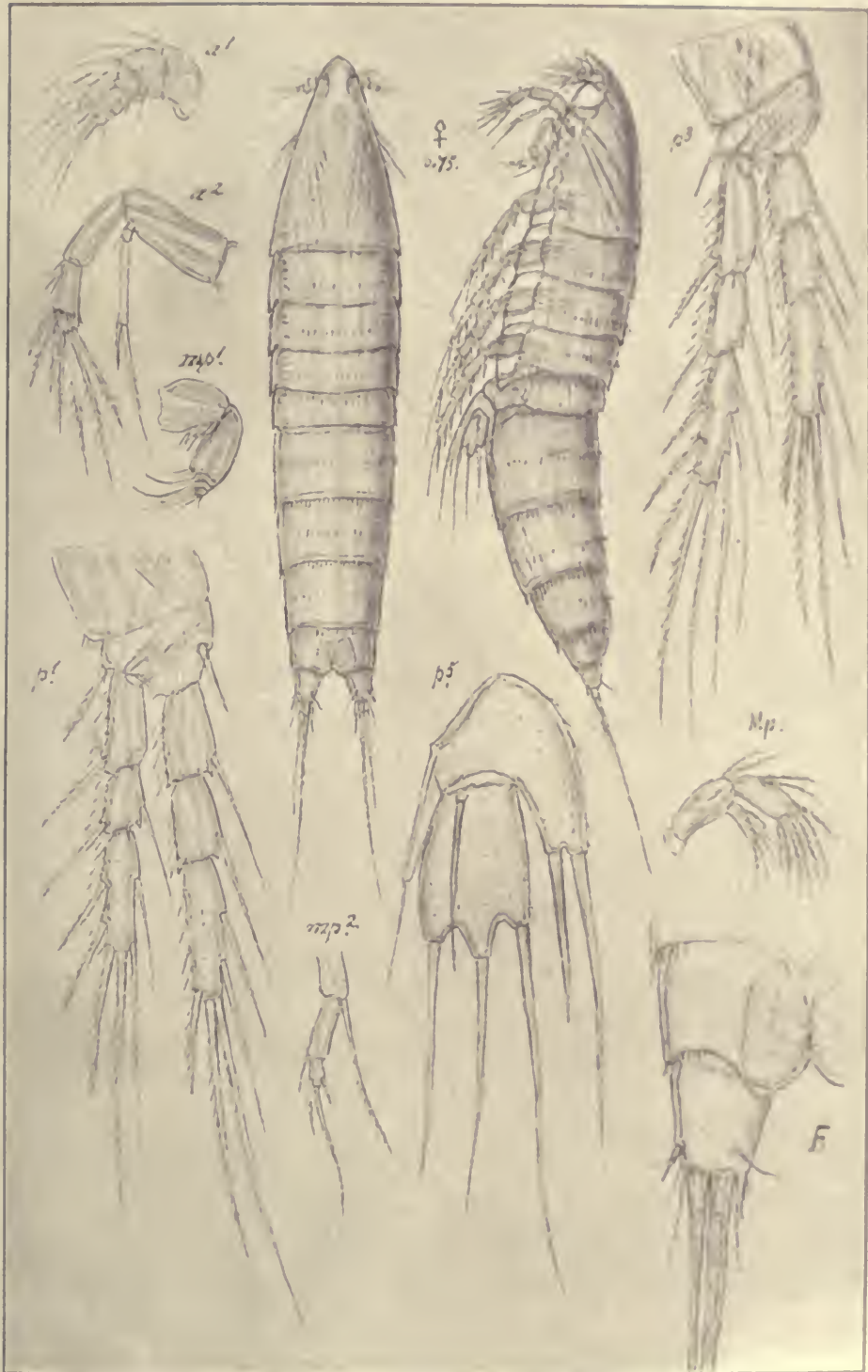
Pseudobradia leptognatha, G. O. Sars

Copepoda

Ectinosomidae

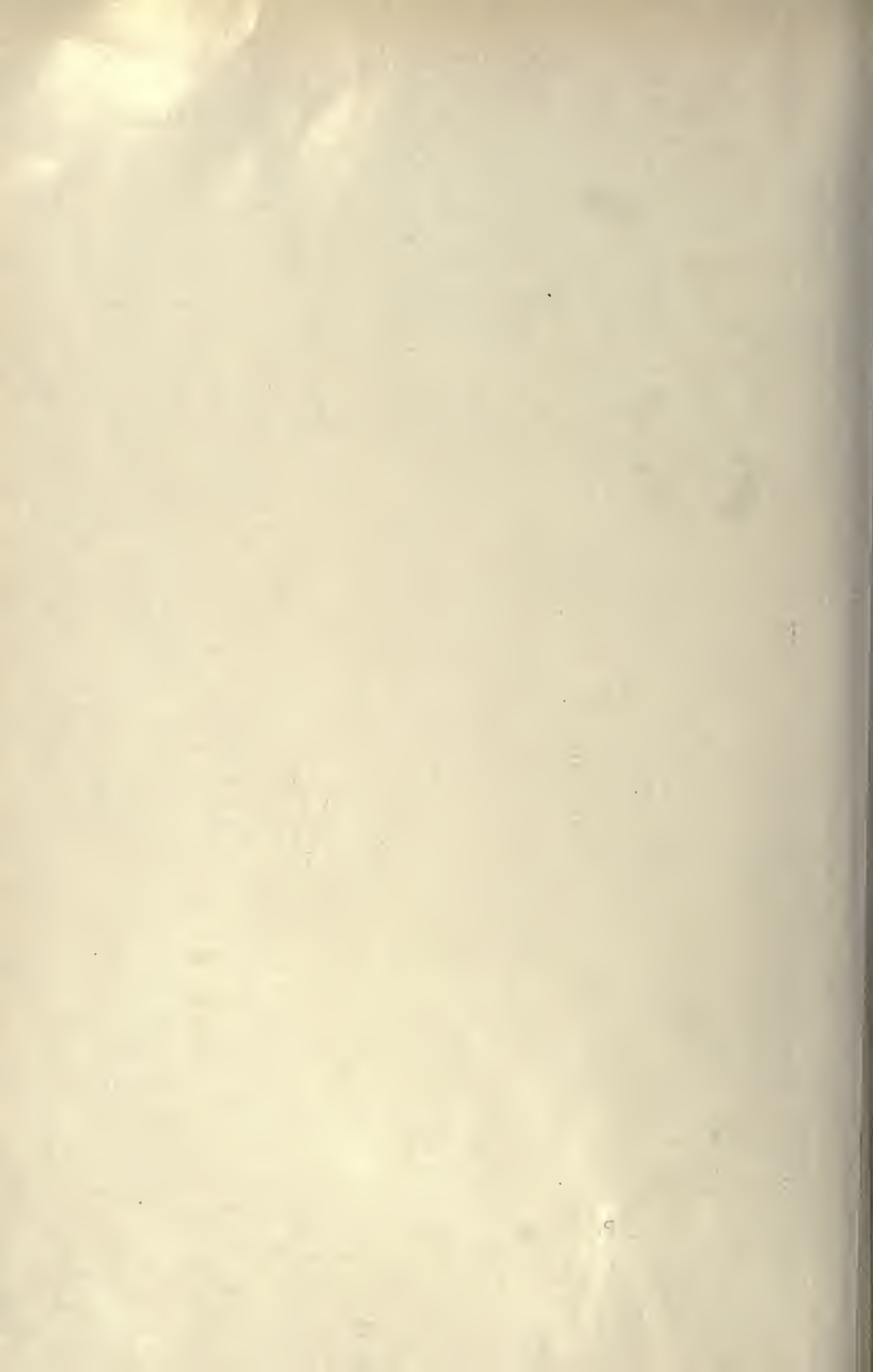
Suppl. Volume

Pl. XXI



G. O. Sars, del.

Pseudobradya scabriuscula, G. O. Sars



Copepoda

Ectinosomidæ

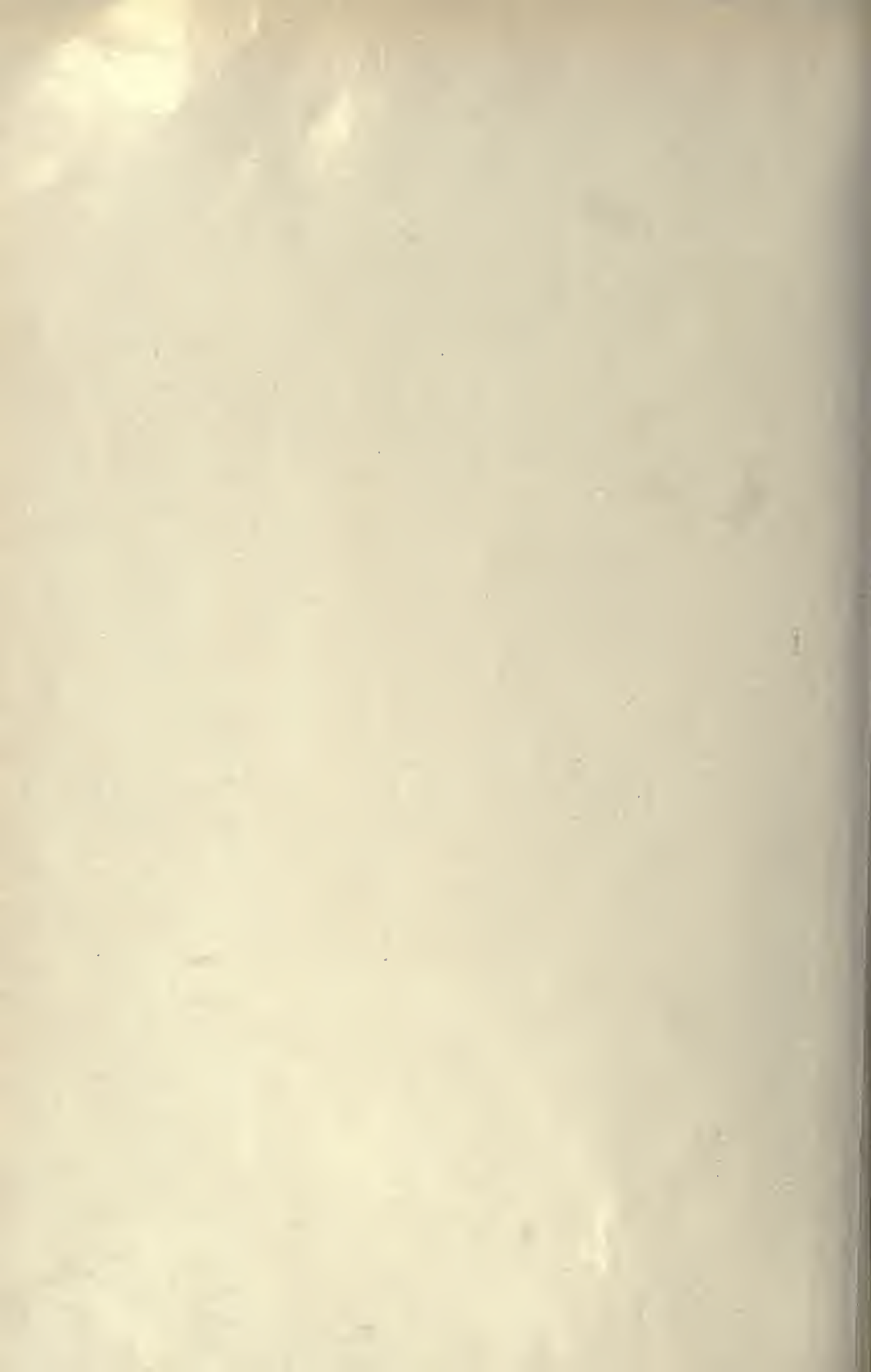
Suppl. Volume

Pl. XXII



G. O. Sars, del.

Pseudobradya attenuata, G. O. Sars

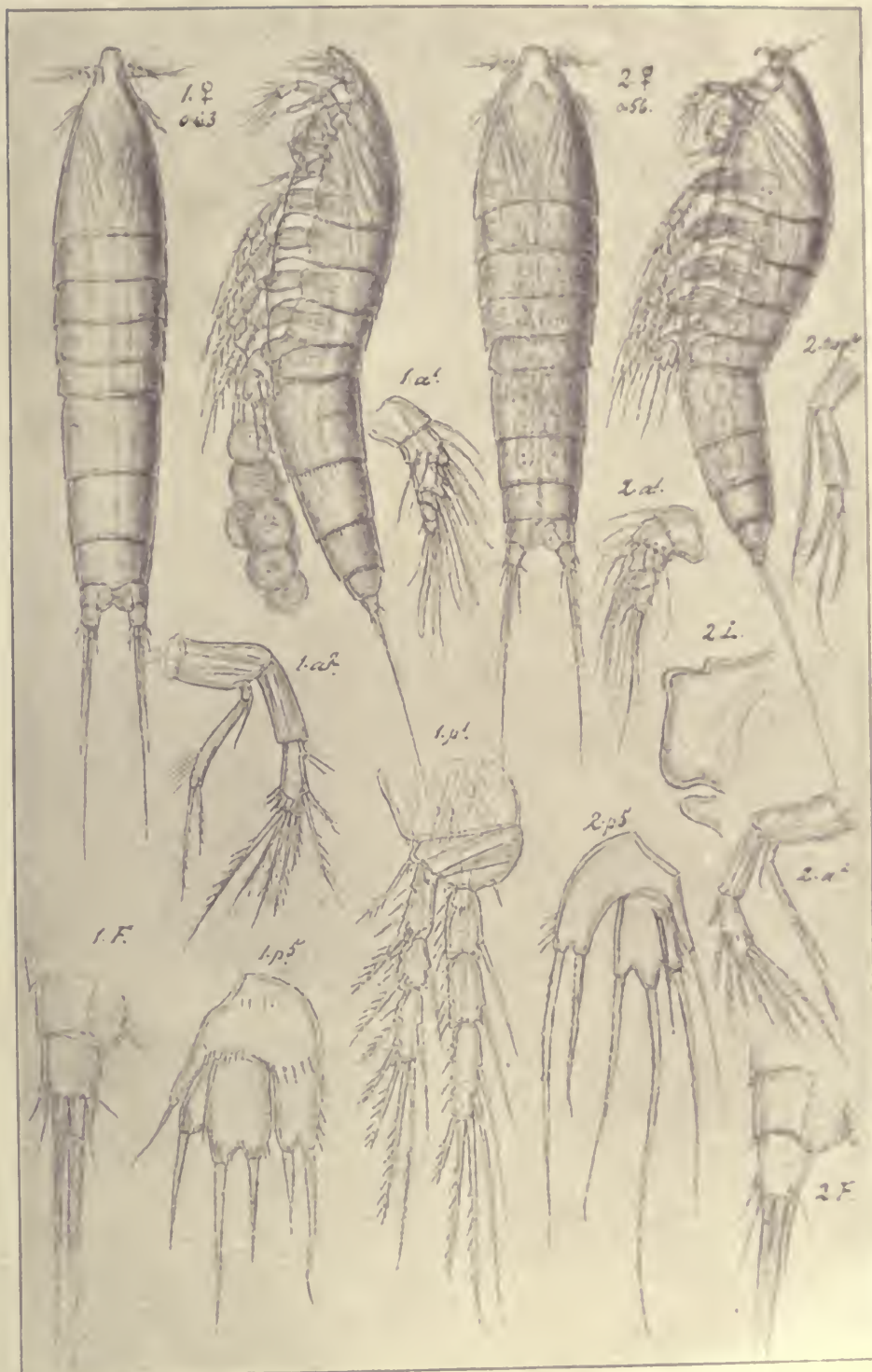


Copepoda

Suppl. Volume

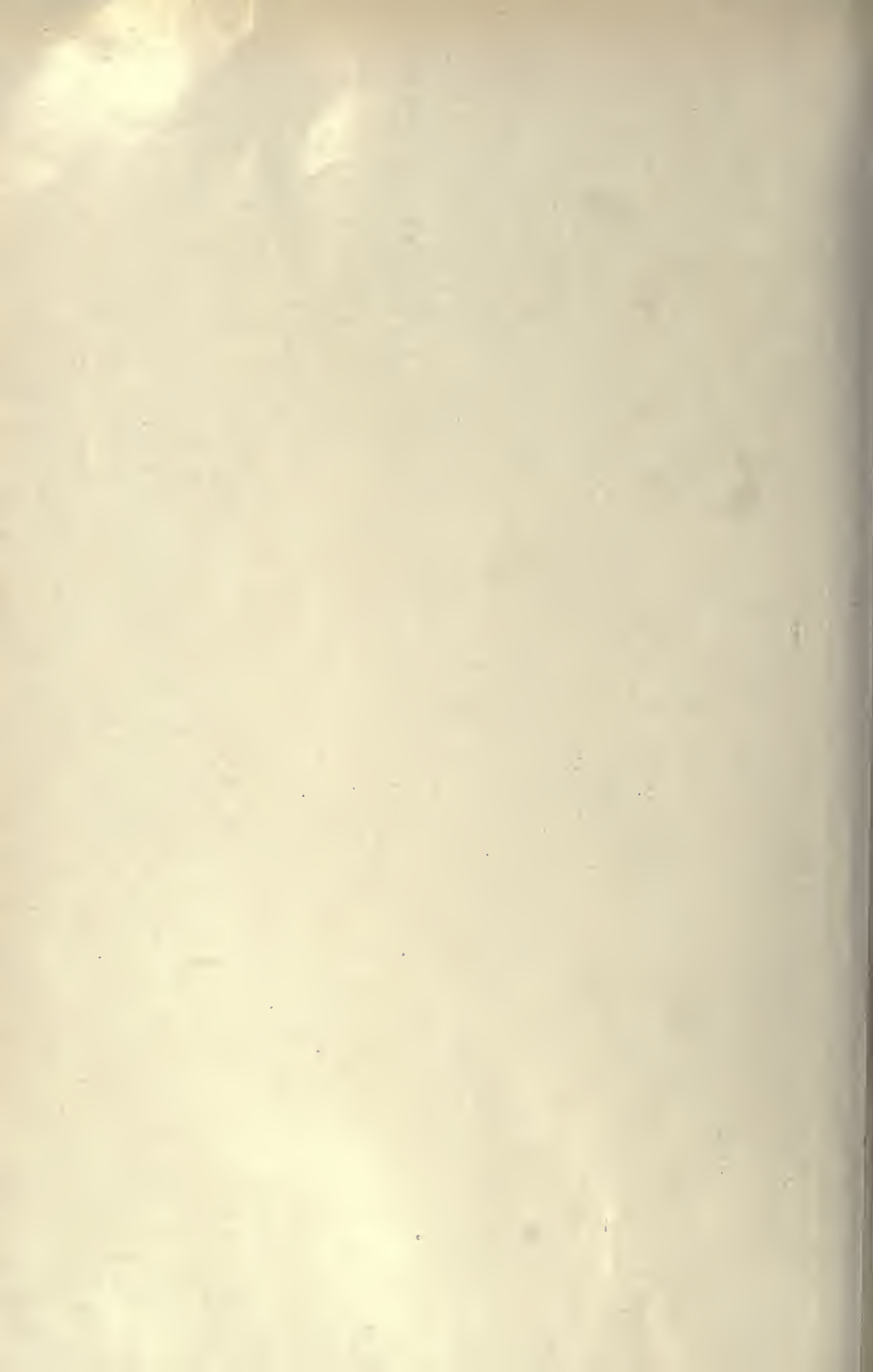
Ectinosomidæ

Pl. XXIII



G. O. Sars, del.

1. *Pseudobradia tenella*, G. O. Sars
2. „ „ *parvula*, G. O. Sars

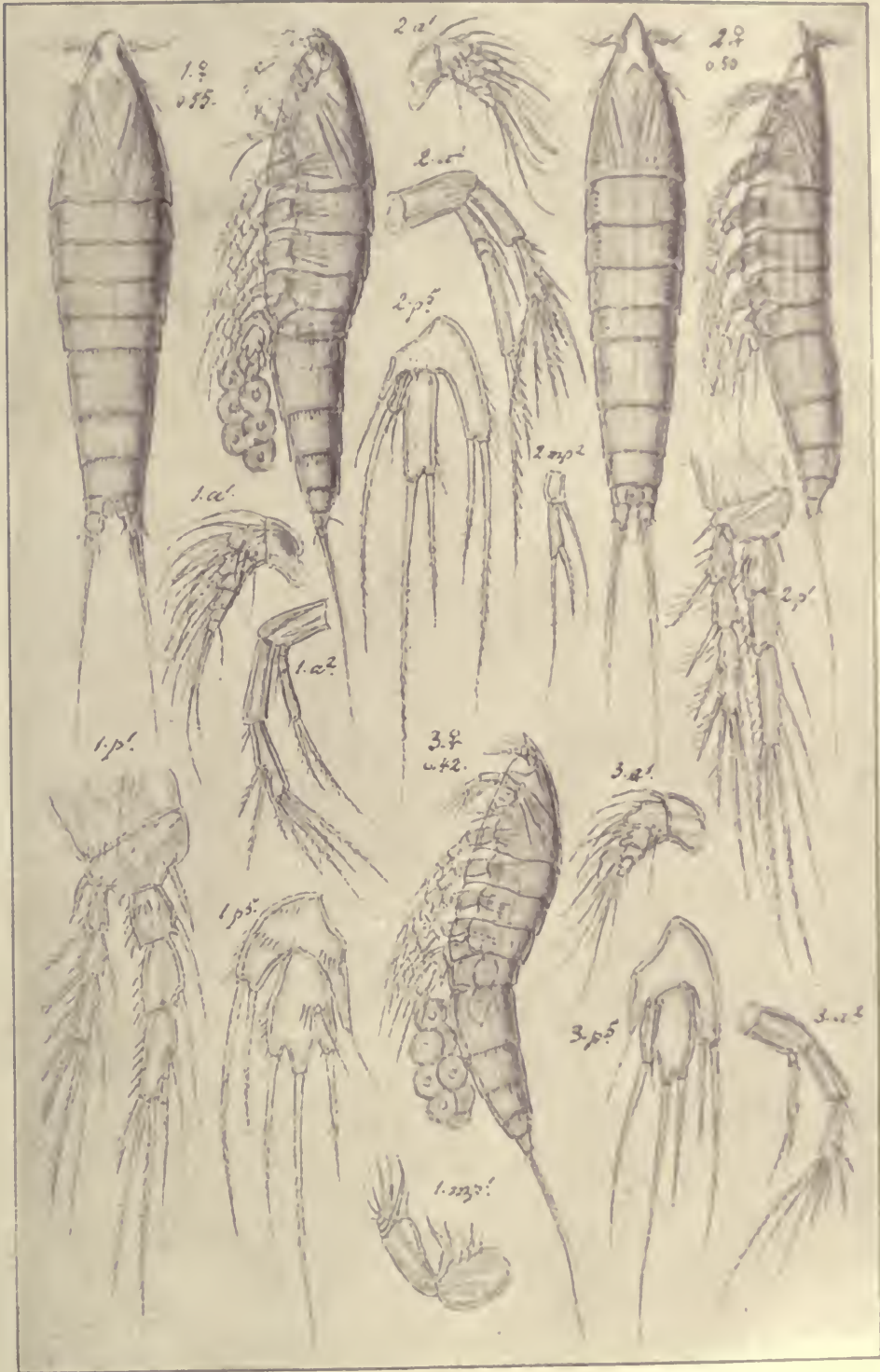


Copepoda

Ectinosomidae

Suppl. Volume

Pl. XXIV

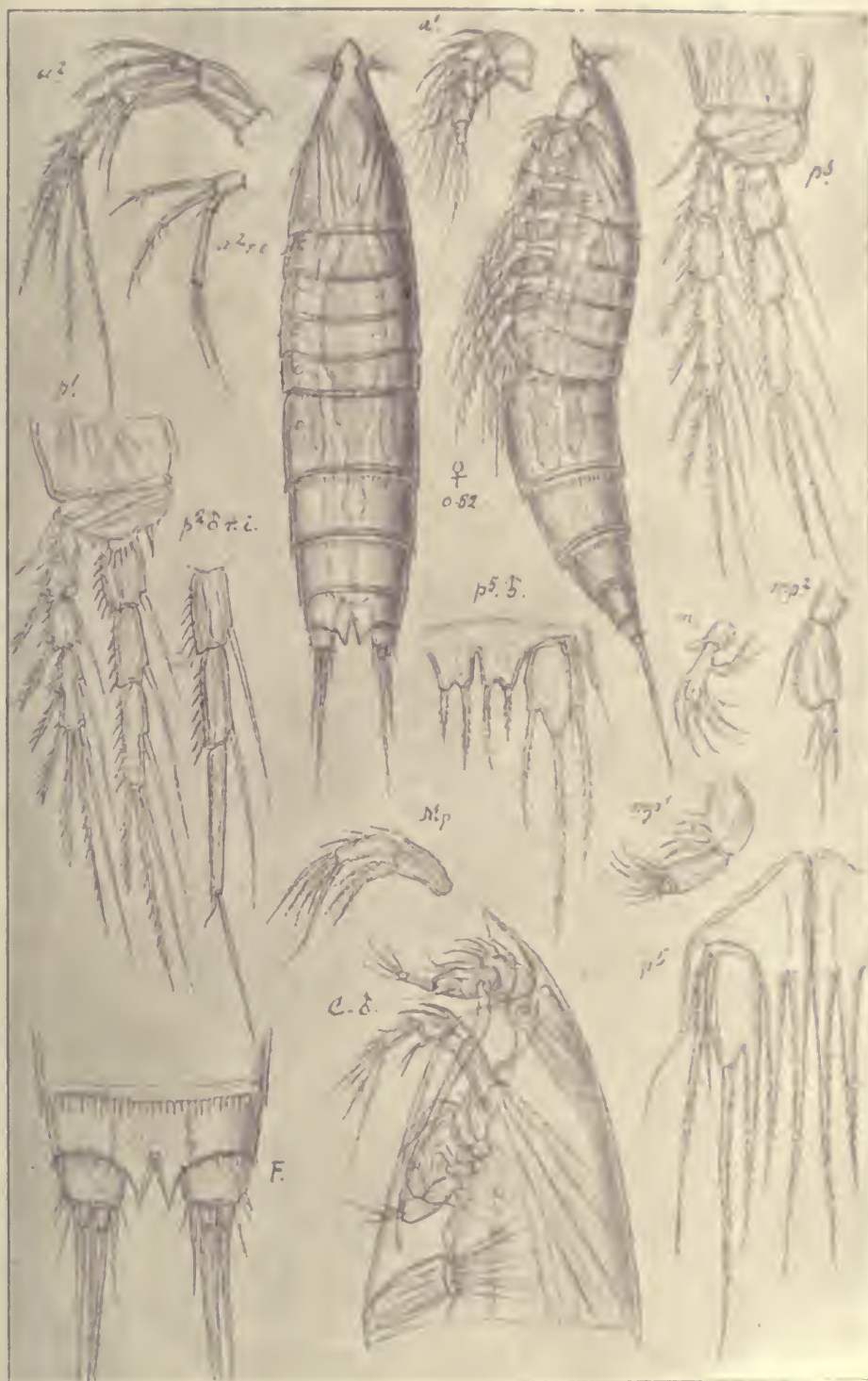


G. O. Sars, del.

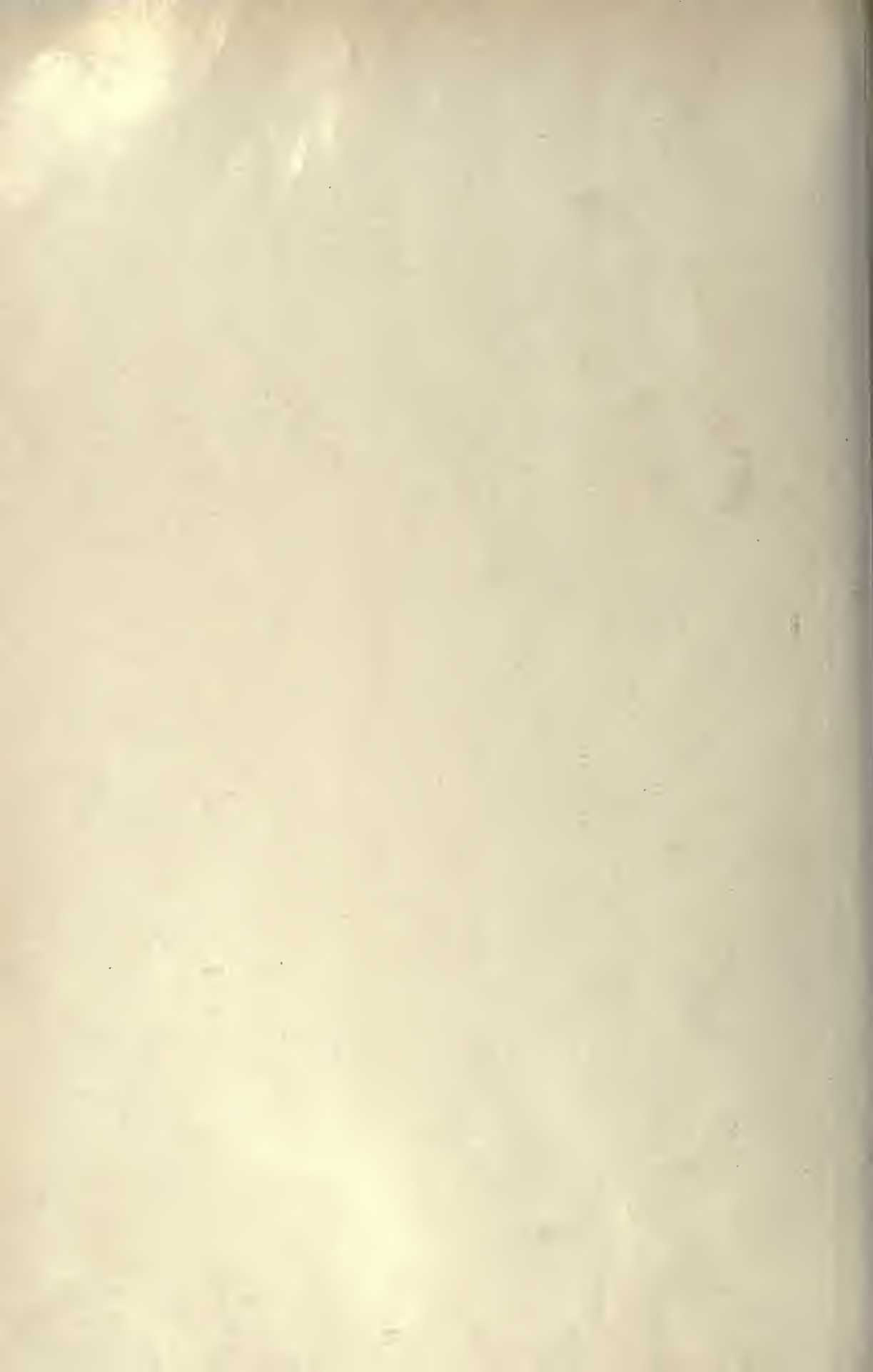
1. *Pseudobradia pulchella*, G. O. Sars
2. " *exilis*, G. O. Sars
3. " *pygmæa*, G. O. Sars

Suppl. Volume

P1 XXV



Pseudobradya *ambigua*, G. O. Sars



Copepoda

Ectinosomidae

Suppl. Volume

Pl. XXVI



G. O. Sars, del.

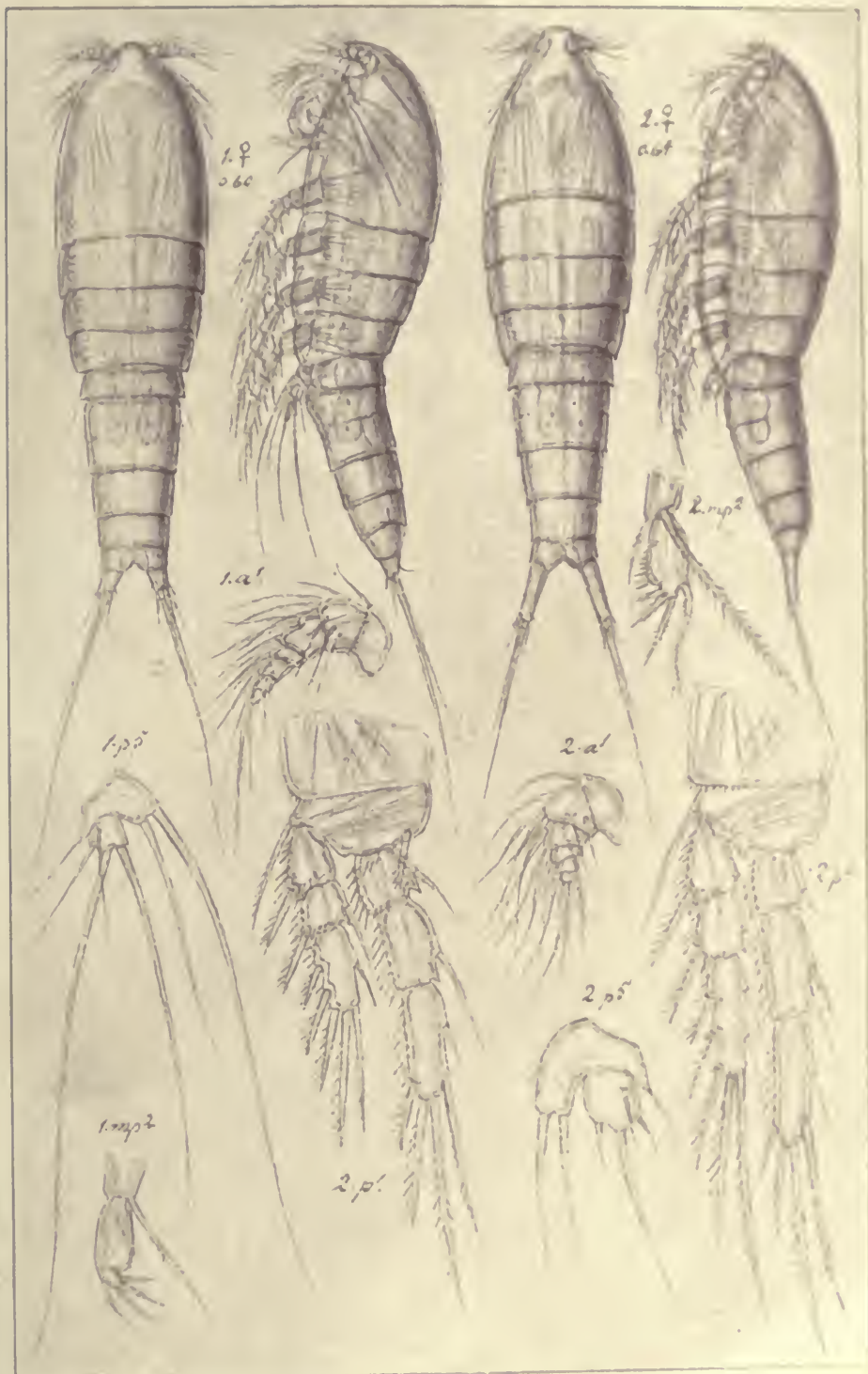
Brady Scotti, G. O. Sars

Copepoda

Ectinosomidæ

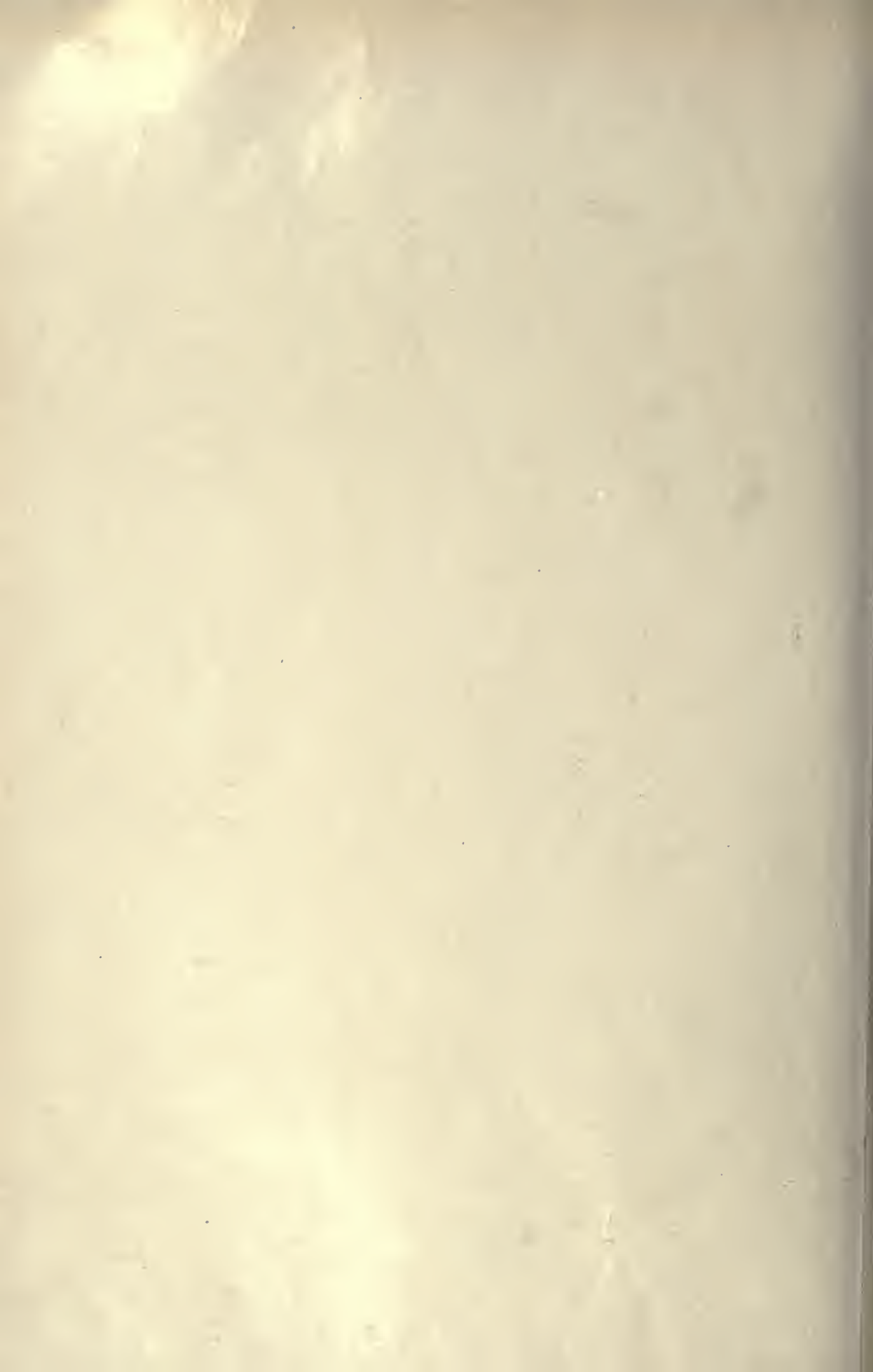
Suppl. Volume

Pl. XXVII



G. O. Sars, del.

1. *Bradia macrochæta*, G. O. Sars
2. " *furcata*, G. O. Sars



Copepoda

Ectinosomidae

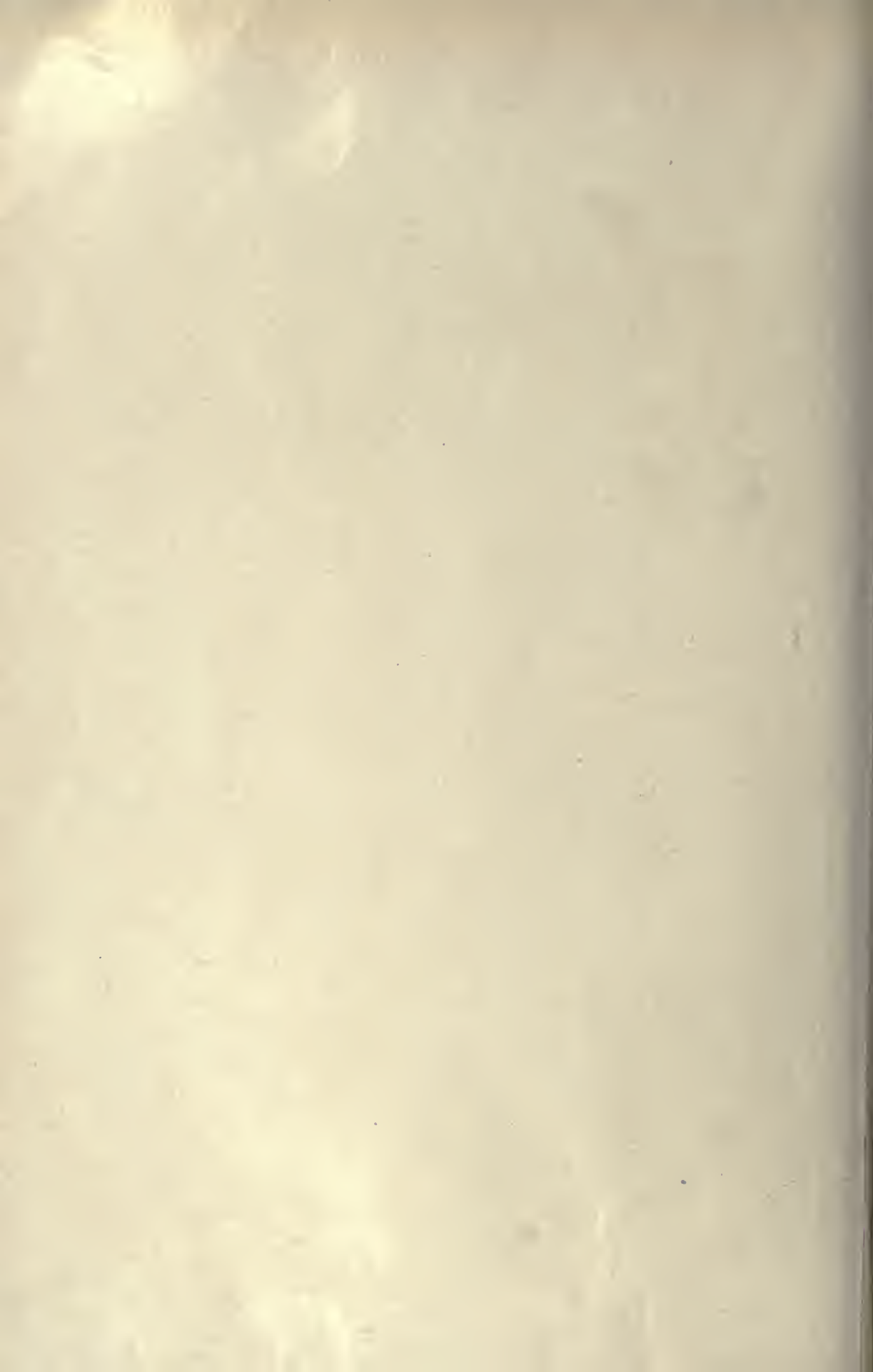
Suppl. Volume

Pl XXVIII



G. O. Sars, del.

1. *Bradya congenera*, G. O. Sars
2. " *simulans*, G. O. Sars

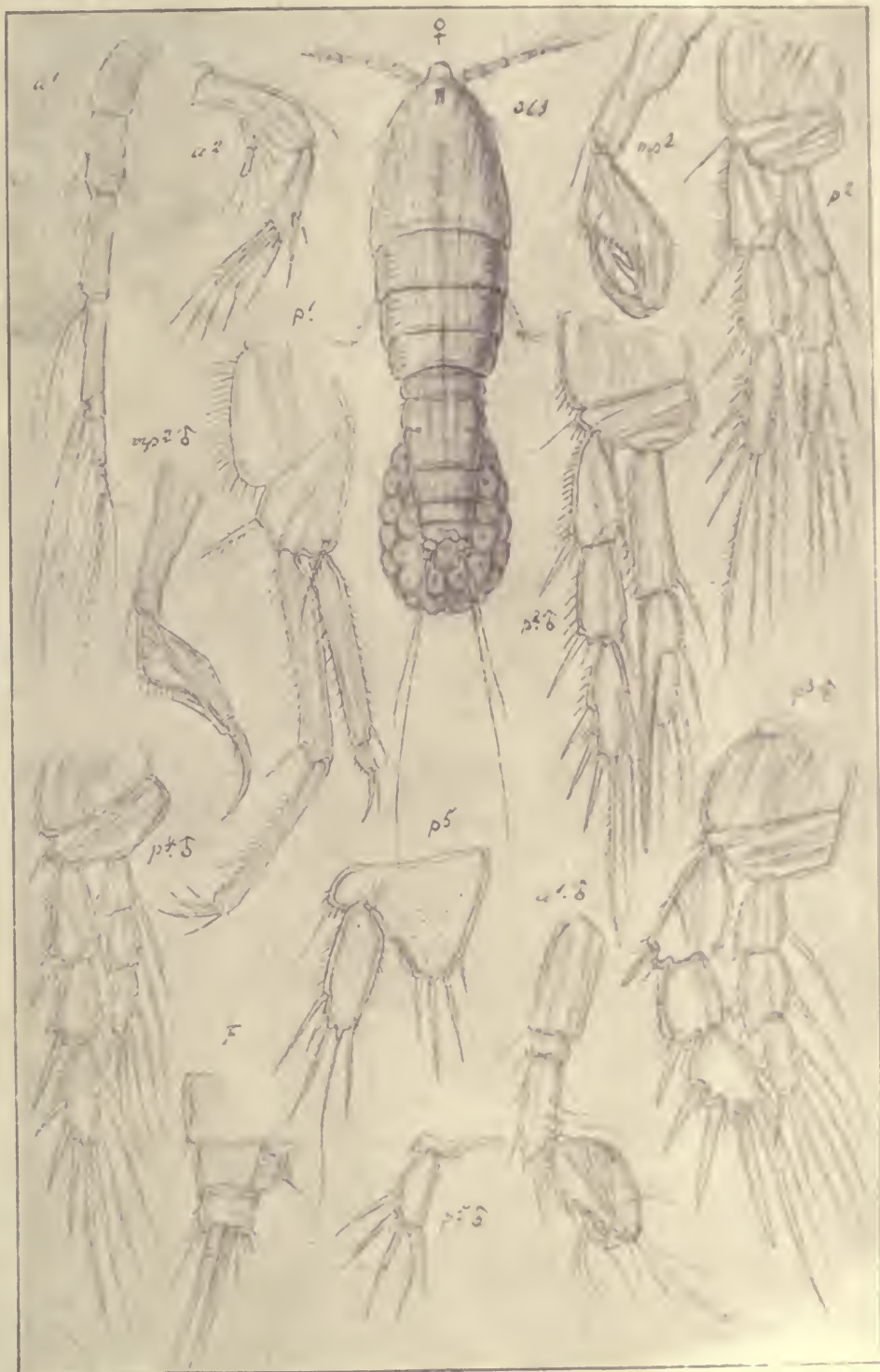


Copepoda

Harpacticidæ

Suppl. Volume

Pl. XXX



G. O. Sars, del.

Harpacticus tenellus, G. O. Sars

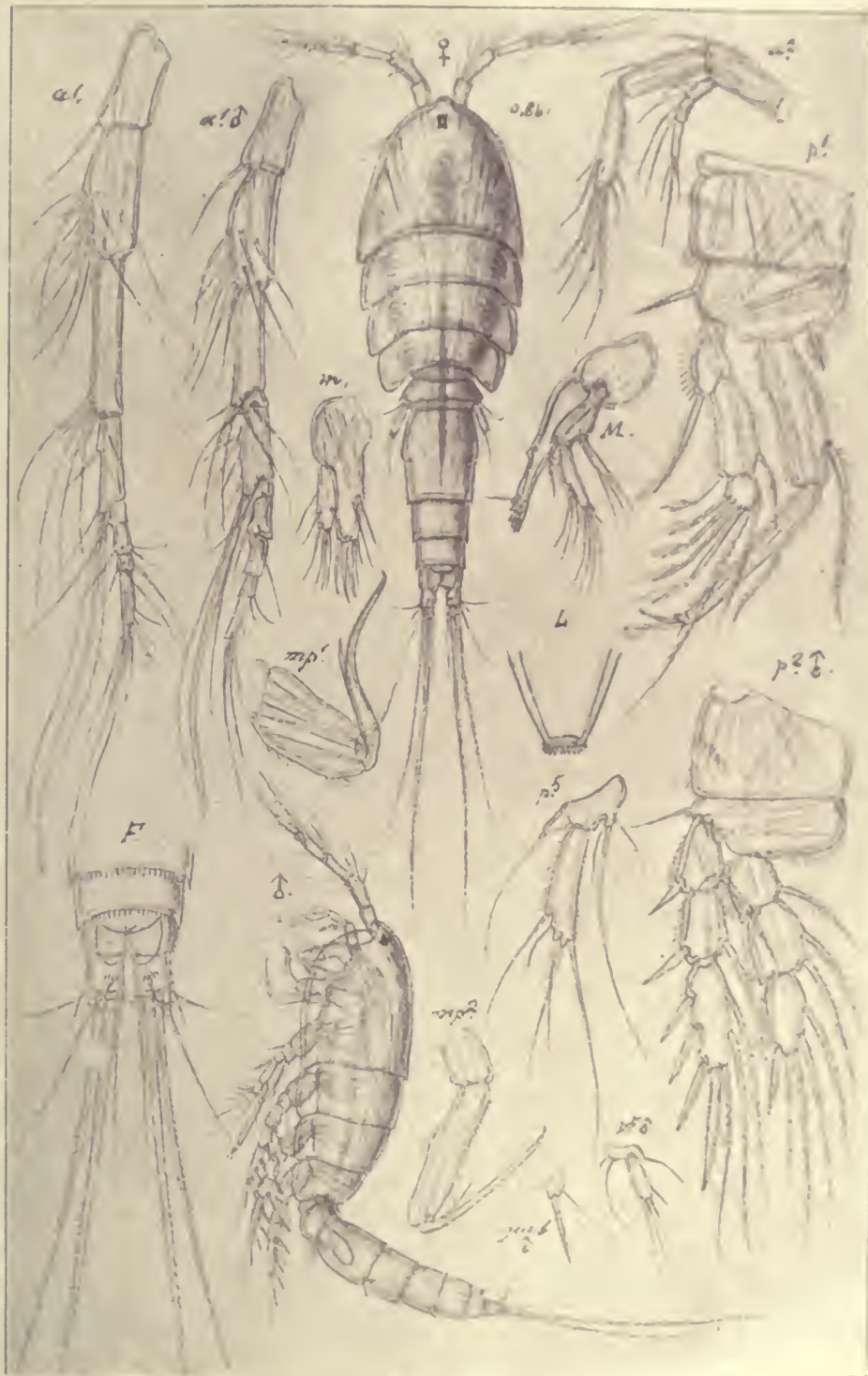


Copepoda

Idyadæ

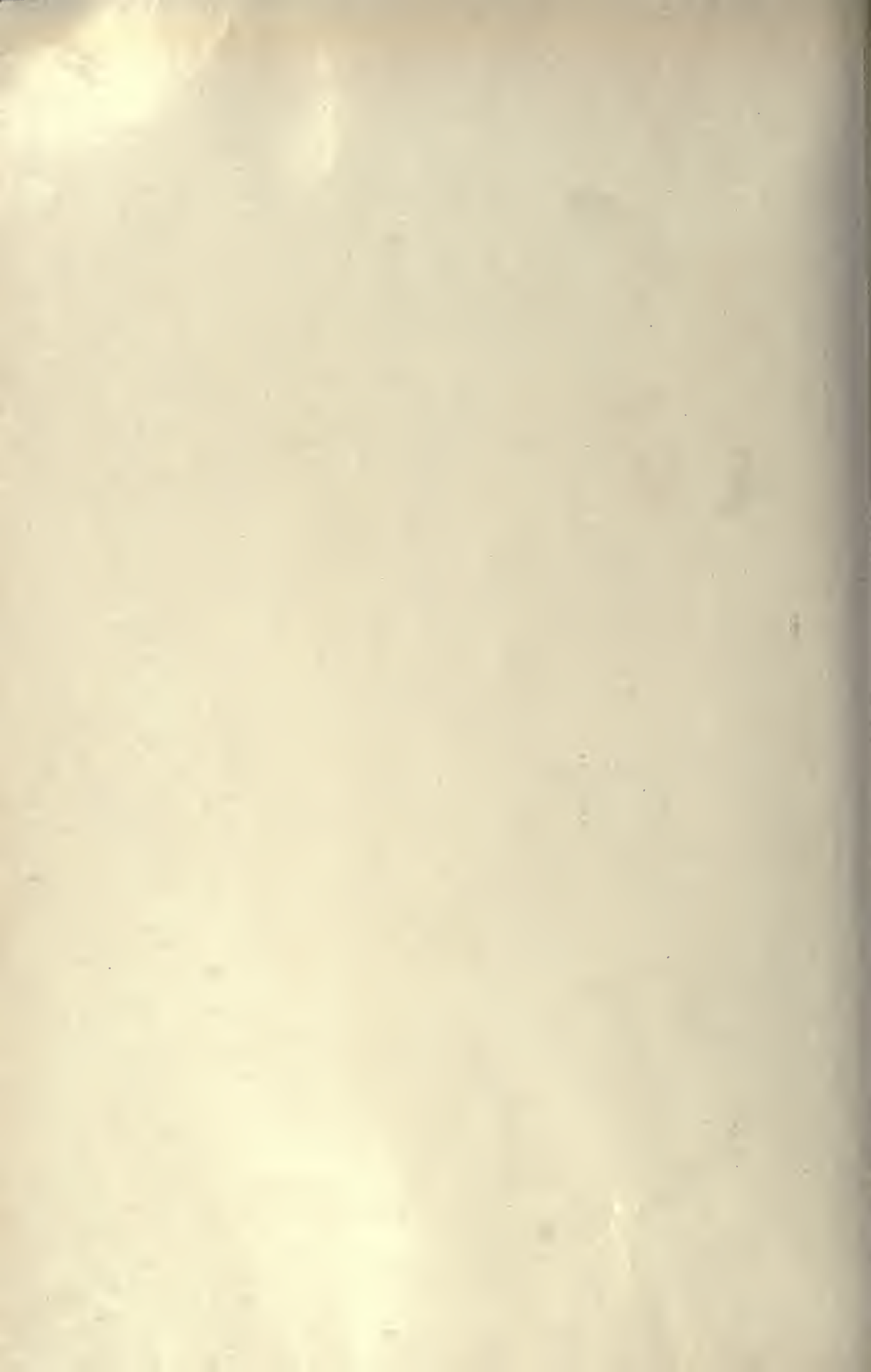
Suppl. Volume

PL XXXI



G. O. Sars, del.

Idyæa graciloides, G. O. Sars



Copepoda

Idyæidæ

Suppl. Volume

Pl. XXXII



G. O. Sars, del.

Idyæa compacta, G. O. Sars

Antennæ and oral parts built on the very same type as in the 2 other known species. 1st pair of legs likewise of a very similar structure, the inner ramus being considerably longer than the outer, and only composed of 2 joints very sharply defined from each other, the distal one slightly shorter and much narrower than the proximal one, and armed at the tip with 2 exceedingly slender claw-like spines accompanied inside by a small bristle; inner edge of this joint carrying 2 somewhat larger setæ. The 3 succeeding pairs with the basal part rather broad and flattened, rami slender and of nearly equal length. Last pair of legs very narrow, with the proximal joint simple cylindric in shape, not expanded inside, distal joint a little longer than the proximal one, and conically tapered, with 3 small setæ on the tip and another somewhat larger seta inside near the base.

Colour of the living animal not yet ascertained.

Length of adult female 0.58 mm.

Remarks.—The above-described form is unquestionably referable to the genus *Idyella*, as defined by the present author, exhibiting, as it does, a structure of the several appendages very similar to that found in the 2 other known species. It is however of considerably larger size than either of them and also of a comparatively more robust form of the body.

Occurrence.—A solitary female specimen only of this form has as yet come under my notice. It was found in a sample taken some years ago outside Christiansand from a depth of about 30 fathoms.

42. *Idyella exigua*, G. O. Sars.

See Vol. V, p. 101, Pl. LVIII, fig. 2.

(Pl. XXXIII, fig. 2).

Remarks.—The female of this species has been described and figured in Vol. V from some specimens taken at Bukken, south west coast of Norway. I have subsequently found this form not unfrequently in several places on the south coast, Korshavn, Lillesand, Risør, in depths ranging from 20 to 60 fathoms. Male specimens are very rarely met with, and may also easily escape attention on account of their small size. On the accompanying plate I have given some detail-figures of such a specimen, elucidating the rather well-marked sexual differences in the structure of the anterior antennæ and the 2nd and last pairs of legs.

Gen. **Idyanthe**, G. O. Sars.

Remarks.—This name was proposed by the present author in 1909, to replace *Idyopsis*, the latter name having been preoccupied.

43. **Idyanthe dilatata**, G. O. Sars.

See Vol. V, p. 98, Pl. LVII, fig. 1.

(Pl. XXXIII, fig. 3).

Remarks.—Of this form also only the female sex has been described. The male, of which a solitary specimen was obtained at Risør, differs from the female in a much similar manner to that found in *Idyella*. On the accompanying plate the inner ramus of a leg of the 2nd pair from this male specimen is figured.

Fam. **Diosaccidæ**.

Gen. **Stenheliopsis**, G. O. Sars.

Remarks.—Three well-defined species of this genus have been recorded in Vol. V, and a 4th species, nearly allied to the typical one, is now added, and will be described below.

44. **Stenheliopsis affinis**, G. O. Sars, n. sp.

(Pl. XXXIV).

Specific Characters.—*Female.* General form of body resembling that in *S. divaricata*, being comparatively rather short and stout, with the anterior division considerably broader than the posterior. Cephalic segment large and evenly rounded in front; rostral plate prominent, linguiform, blunted at the tip. Urosome about the length of the anterior division and quite smooth. Caudal rami still more abruptly divergent than in the type species, but comparatively less slender, scarcely exceeding in length the last 2 caudal segments combined, each ramus armed at the somewhat thickened base with a transverse row of small denticles; innermost but one of the apical setæ very strong and closely annulated in the middle, curving abruptly outwards and forwards in a sigmoid

manner and crossing the neighbouring seta at some distance from its base. Anterior antennæ composed of 5 joints, the first 2 of which are much the largest, outer part of the antenna, as in the type species, abruptly recurved and densely clothed with strong curved setæ. Posterior antennæ and oral parts built on the same type as in *S. divaricata*. Natatory legs likewise rather similar in structure, the inner ramus being in all of them only composed of 2 joints. Last pair of legs resembling in shape those in the type species, though having the inner expansion more distinctly defined and the marginal setæ considerably longer. Ovisacs small, each containing only a single ovum.

Colour whitish.

Length of adult female 0.63 mm.

Remarks.—The present form is closely allied to the type species, *S. divaricata* G. O. Sars, but of somewhat larger size, differing moreover in the comparatively less slender caudal rami, as also somewhat in the structure of the anterior antennæ and the last pair of legs.

Occurrence.—Some specimens of this form, all of the female sex, were found at Risør in depths ranging from 30 to 50 fathoms, muddy bottom.

Fam. Canthocamptidæ.

Gen. *Attheyella*, Brady.

45. *Attheyella* *Schmeili*, (Mrázek).

(Pl. XXXV).

Canthocamptus Schmeilii, Mrázek, Beitrag zur Kenntniss der Harpacticidenfauna des Süsswassers. Zool. Jahrb. Vol. 7, p. 116, Pl. 7, figs. 107—117.

Specific Characters.—*Female.* Body comparatively slender and only slightly tapered behind, with all the segments distinctly denticulated along the hind edge dorsally. Cephalic segment about the length of the 3 succeeding segments combined, and broadly rounded in front, without any distinctly defined rostral projection. Urosome almost as long as the anterior division; genital segment somewhat shorter than the 2 succeeding segments combined; last segment well developed and of about same size as the preceding segment; anal opercle only slightly prominent, and obtusely truncated at the end, with the edge very finely denticulated. Caudal rami comparatively large, exceeding

somewhat in length the anal segment, and obpyriform in outline, being rather broad at the base and gradually tapered distally, inner edge considerably bulged at the base and, like the outer, coarsely ciliated; seta of outer edge attached far in front; dorsal seta well developed and issuing a little farther behind; apex provided with only a single well-developed seta flanked by 2 small bristles. Anterior antennæ a little shorter than the cephalic segment, with the joints rather sharply marked off from each other, terminal part a little shorter than the proximal one. Posterior antennæ with the outer ramus comparatively small, though distinctly biarticulate, distal joint short, carrying on the tip a stout spine and a short seta. Mandibles with the palp very small, uniarticulate, with 2 apical setæ. Maxillæ and maxillipeds of normal structure. 1st pair of legs with the inner ramus considerably longer than the outer, though only composed of 2 joints; middle joint of outer ramus wanting the usual seta inside. The 3 succeeding pairs of legs having the outer ramus rather strongly built, with the spines very coarse; inner ramus, as usual, poorly developed, biarticulate, with the distal joint very narrow and only carrying a single apical seta. Last pair of legs of moderate size, with the distal joint oval in form and edged with 5 setæ, the middle one small and not ciliated; inner expansion of proximal joint narrow linguiform and not extending as far as the distal joint, marginal setæ 5 in number.

Male smaller than female and exhibiting the usual sexual differences, being moreover distinguished by the much smaller size of the caudal rami. Inner ramus of 2nd pair of legs comparatively larger than in female, extending about to the middle of the terminal joint of the outer; that of 3rd pair transformed in the usual manner, being distinctly 3-articulate, with the middle joint produced at the end outside to a strong mucroniform process. 4th pair of legs with the spine attached to the middle joint of the outer ramus very strong and somewhat twisted; inner ramus very small and tipped with a strong spiniform seta and a much smaller bristle. Last pair of legs, as usual, much reduced in size.

Colour whitish gray, with a faint yellow tinge.

Length of adult female 0.63 mm.

Remarks.—This form, first described by Mrázek as a species of *Canthocamptus*, ought evidently to be referred to the present genus, as defined in Vol. V. It is easily recognised by the comparatively large size of the caudal rami, which however, unlike what is generally the case, exhibit a somewhat different appearance in the two sexes.

Occurrence.—Like the other known species of the present genus, this form is exclusively an inhabitant of fresh water. The only locality where I as yet have met with it, is the lake Vansjø near Moss. It occurred here occasionally, together with *Moraria brevipes* G. O. Sars, in a depth of 3—6 fathoms, muddy bottom.

Distribution.—Bohemia (Mrázek), British Isles (Scott), Sweden (Lilljeborg).

Gen. *Ameira*, Boeck.

46. *Ameira dubia*, G. O. Sars, n. sp. (Pl. XXXVI).

Specific Characters.—*Female.* Body comparatively slender, with the anterior division conspicuously dilated in its anterior part. Cephalic segment large, equalling in length the 3 succeeding segments combined, frontal edge slightly angular, but without any distinctly defined rostrum. Urosome rather narrow, equalling in length about $\frac{3}{4}$ of the anterior division; genital segment longer than the 2 succeeding segments combined; last segment fully as large as the preceding one. Caudal rami short, being only slightly longer than they are broad, and somewhat divergent; apical setæ well developed. Anterior antennæ fully as long as the cephalic segment and distinctly 8-articulate, terminal part exceeding half the length of the proximale one. Posterior antennæ and oral parts of normal structure. 1st pair of legs imperfectly prehensile, the inner ramus being only slightly longer than the outer, with the 1st joint scarcely longer than the other 2 combined. The 3 succeeding pairs of legs of normal appearance, except that the terminal joint of the outer ramus in the 3rd and 4th pairs has inside 3, instead of 2 setæ. Last pair of legs with the distal joint rather narrow, oblong in form, and somewhat constricted at the base, marginal setæ 6 in number; inner expansion of proximal joint comparatively large, broadly linguiform, and extending beyond the middle of the distal joint; marginal setæ rather strong and 5 in number.

Colour not yet ascertained.

Length of adult female 0.90 mm.

Remarks.—This is a somewhat anomalous form, differing from the more typical species of the present genus by the imperfectly prehensile character of the 1st pair of legs and the greater number of setæ on some of the succeeding pairs. In these respects it agrees with the aberrant species, *A. simplex* Scott, and should perhaps, together with this species, be included in a

particular genus intermediate between *Ameira* and *Parameira*. It is of rather large size, as compared with the other known species.

Occurrence.—Two female specimens of the present form were found in a sample taken at Risør from a depth of about 30 fathoms.

47. *Ameira exilis*, Scott.

(Pl. XXXVII).

Ameira exilis, Scott, Twelfth Ann. Report of the Fishery Board for Scotland, Part 111, p. 242, Pl. X, figs. 1—12.

Specific Characters.—*Male*. Body exceedingly slender and narrow, linear in form, with the anterior division scarcely broader than the posterior. Cephalic segment about the length of the 2 succeeding segments combined and obtusely blunted in front, rostral projection inconspicuous. Urosome fully as long as the anterior division, with the segments subequal in size and almost perfectly smooth. Caudal rami comparatively short, being scarcely more than half as long as the anal segment; apical setæ of moderate length. Anterior antennæ about the length of the first 2 body-segments combined, and very conspicuously hinged, the middle portion being considerably dilated; terminal part composed of 3 elongated joints, the last clothed with long curved setæ. Posterior antennæ with the outer ramus biarticulate, distal joint however very small and less distinctly defined at the base. Mandibles with the palp of unusual size, its proximal joint forming inside a broad lamellar expansion armed with 3 strong, spiniform setæ; distal joint narrow, sublinear in form. Maxillæ and maxillipeds of normal structure. 1st pair of legs distinctly prehensile, the inner ramus being much longer than the outer, with the last 2 joints bent inwards, and combined about the length of the 1st joint; middle joint of outer ramus with a well-defined seta inside, wanting in the other known species; spine issuing from the inner corner of the 2nd basal joint very strong and sub-hamate at the tip. The 3 succeeding pairs of legs of normal structure and rather slender, especially the 4th pair, the outer ramus of which is fully twice as long as the inner. Last pair of legs more fully developed than is generally the case in male specimens; distal joint oval in form and provided with 6 marginal setæ, 4 of which issue from the obtusely blunted end, one of the latter (the innermost but one) very much elongated; inner expansion of proximal joint well developed and rather prominent, extending about to the middle of the distal joint, marginal setæ 5 in number, the outermost but one the longest.

Colour whitish, pellucid.

Length of the specimen examined 1.12 mm.

Remarks.—The above described form is evidently referable to the large species recorded by Scott as *A. exilis* and observed by that author in both sexes. Mr. Scott states the length of the adult female to be no less than 1.40 mm., and the present form accordingly grows to a size far exceeding that in any of the other known species of *Ameira*.

Occurrence.—A solitary male specimen only of this form has as yet come under my notice. It was captured at Risør from a depth of about 20 fathoms.

Distribution.—Scottish coast (Scott).

Gen. *Parameira*, G. O. Sars.

Remarks.—Of this genus 4 well-defined species have been recorded by the present author, 3 from the Norwegian coast and one from the Polar Islands North of Grinnels Land (2nd Fram Expedition). Two additional species, both of which have been previously observed by Scott, will be described below.

48. *Parameira longiremis*, (Scott).

(Pl. XXXVIII, fig. 1).

Ameira longiremis, Scott, Twelfth Annual Report of the Fishery Board for Scotland, Part 111, p. 241, Pl. V, figs. 29—32; Pl. VI, figs. 1—5.

Specific Characters.—*Female.* Body comparatively short and robust, with the 2 chief divisions rather sharply marked off from each other. Cephalic segment about the length of the 2 succeeding segments combined and evenly rounded in front, rostral projection inconspicuous. Urosome much shorter than the anterior division and almost of equal width throughout; genital segment large, exceeding somewhat in length the 2 succeeding segments combined; last segment scarcely shorter than the preceding one, with the anal opercle considerably prominent and narrowly rounded at the end. Caudal rami very small and remote from each other; apical setæ of moderate length. Anterior antennæ comparatively short and stout, not attaining the length of the cephalic segment, 2nd joint only slightly longer than it is broad. Posterior antennæ with the outer ramus very small, uniarticulate, carrying 2 short setæ, the one apical, the other lateral. Oral parts normal. 1st pair of legs with the inner ramus considerably longer than the outer, its 1st joint rather dilated

and about the length of the terminal joint, middle joint comparatively short. The 3 succeeding pairs of legs exhibiting the structure characteristic of the genus. Last pair of legs with the distal joint exceedingly slender and narrow, sublinear in form, being fully 5 times as long as it is broad, and clothed on both edges with scattered hairs; marginal setæ 5 in number, all issuing from the end of the joint; inner expansion of proximal joint triangular in form and carrying 5 strong setæ.

Colour not yet ascertained.

Length of adult female 0.58 mm.

Remarks.—Though rather inferior in size, the above-described form agrees pretty well with the description and figures given by Scott of his *Ameira longiremis*, and its identity with that species seems to me therefore to be beyond doubt. It is unquestionably referable to the genus *Parameira*, as defined by the present author, and may be recognised from the other species of that genus by the comparatively robust form of the body, and more particularly by the very slender and narrow distal joint of the last pair of legs.

Occurrence.—Some few specimens of this form, all of the female sex, were picked up from samples taken at Korshavn in depths ranging from 30 to 50 fathoms, muddy sand.

49. *Parameira intermedia*, (Scott).

(Pl. XXXVIII, fig. 2).

Ameira longiremis, var. *intermedia*, Scott, Twelfth Annual Report of the Fishery Board for Scotland, Part 111, p. 242, Pl. VI, figs. 6—14.

Specific Characters.—*Female.* Body considerably more slender than in the preceding species, with the anterior and posterior divisions of nearly equal length. Last caudal segment a little shorter than the preceding one, with the anal opercle less prominent and evenly rounded at the end. Caudal rami a little longer than they are broad; apical setæ of moderate length. Anterior antennæ comparatively shorter than in the preceding species, otherwise of a very similar structure. Posterior antennæ with the outer ramus, as in that species, very small, unarticulate, but rather narrower, with both setæ issuing from the end. 1st pair of legs resembling in structure those in *P. longiremis*, inner ramus however comparatively shorter, with all 3 joints of about equal length. Last pair of legs with the distal joint not nearly so elongated as in the preceding species and oblong oval in form; inner expansion

of proximal joint extending about to the middle of the distal joint, and having the marginal setæ less unequal in length than in the preceding species.

Colour not yet ascertained.

Length of adult female 0.62 mm.

Remarks.—The present form is considered by Scott to be only a variety of the preceding species. I think however that the differences indicated in the above diagnosis may suffice for warranting its specific distinctness.

Occurrence.—Of this species also only a small number of specimens have as yet come under my notice. They were obtained from the same samples as the preceding species.

Distribution.—Scottish coast (Scott).

Gen. *Pseudameira*, G. O. Sars.

Remarks.—This genus was established by the present author in the year 1911, to comprise 2 well defined species, both obtained at Korshavn. I am now enabled to add 2 new species of this genus from another locality of the Norwegian coast.

50. *Pseudameira gracilis*, G. O. Sars, n. sp.

(Pl. XXXIX).

Specific Characters.—*Female.* Body much more slender and elongated than in either of the 2 previously described species, with the anterior division only slightly broader than the posterior. Cephalic segment equalling in length the 3 succeeding segments combined and rounded in front; rostral prominence small, but well defined, acuminate. Urosome about the length of the anterior division and nearly smooth; genital segment comparatively large, equalling in length the 3 succeeding segments combined, and distinctly subdivided in the middle; last segment much shorter than the preceding one. Caudal rami considerably produced, equalling in length the last 2 caudal segments combined, and narrow linear in form; apical setæ not much elongated. Anterior antennæ short and stout, not nearly attaining the length of the cephalic segment, but composed of 8 well defined joints, the 2nd of which is the largest and of rounded oval form, with the outer edge arcuate and clothed with stiff hairs; terminal part, comprising the 4 outer joints, short, scarcely exceeding the 2 preceding joints combined, and clothed with long curved setæ. Posterior

antennæ with the outer ramus very narrow, bisetose. Oral parts normal. 1st pair of legs with the inner ramus scarcely longer than the outer, its terminal joint somewhat exceeding the middle one in length. The 3 succeeding pairs of legs comparatively strongly built, and resembling somewhat in structure those in *P. furcata*, the inner ramus being rather produced and extending beyond the outer, its 1st joint rather dilated and, as in *P. furcata*, armed inside near the base with a strong spine, replacing the usual seta, inner edge of the joint beyond the spine densely spinulose; middle joint produced at the end inside to a well developed spiniform process. 2nd basal joint of these legs armed inside with 4—5 coarse denticles. Last pair of legs of comparatively small size; distal joint oval quadrangular in form and remarkably constricted at the base, inner edge bulging and fringed with long cilia; marginal setæ 5 in number, the 2 innermost ones rather slender; inner expansion of proximal joint short and broad, with 5 marginal setæ.

Male, as usual, smaller than female and easily recognisable by the distinctly hinged anterior antennæ; none of the legs transformed.

Colour whitish.

Length of adult female 0.75 mm.

Remarks.—The present form is nearly allied to *P. furcata*, but of considerably larger size, and moreover at once distinguished by the much more slender and elongated form of the body. It also exhibits some well-marked differences in the structural details, as indicated in the above diagnosis.

Occurrence.—I have found this form not unfrequently at Risør in depths ranging from 30 to 60 fathoms, muddy sand.

51. *Pseudameira mixta*, G. O. Sars, n. sp.

(Pl. XL).

Specific Characters.—*Female*. Body of a similar slender form to that of the preceding species, with the anterior division only slightly broader than the posterior. Rostral prominence well marked, but very small, acute. Urosome nearly as long as the anterior division, its last segment of about same size as the preceding one. Caudal rami less produced than in the preceding species, being scarcely longer than the anal segment; apical setæ rather slender. Anterior antennæ still shorter than in the said species and only composed of 6 joints, 2nd joint with the outer edge perfectly smooth. Posterior antennæ with the outer ramus slightly widening distally and carrying 3 setæ, 2 apical and one lateral. 1st pair of legs with the inner ramus distinctly longer than the

outer, its joints of about equal length. The 3 succeeding pairs of legs rather slender, with the inner ramus longer than the outer (at least in 2nd and 3rd pairs), its 1st joint moderately dilated, with the seta of the inner edge very small, not spiniform, and attached beyond the middle, being accompanied behind by a number of thin spinules; 2nd joint not produced at the end inside. Last pair of legs with the distal joint comparatively small, rounded oval in form, and only provided with 4 marginal setæ; inner expansion of proximal joint more produced than in the preceding species, extending almost as far as the distal joint, and obtusely truncated at the end, marginal setæ 4 in number.

Colour whitish.

Length of adult female 0.60 mm.

Remarks.—The present form looks rather like *P. gracilis* in its outward appearance, but is of much smaller size, and moreover at once distinguished by the comparatively less produced caudal rami. In the structure of the several appendages it exhibits a somewhat mixed character; hence the specific name here proposed.

Occurrence.—Only very few specimens of this form have as yet come under my notice. They were taken at Risør from a depth of about 50 fathoms, muddy bottom.

Gen. *Stenocopia*, G. O. Sars.

Remarks.—The type of this genus is the form described by Scott as *Ameira longicaudata*, which however, as pointed out by the present author, must be discarded from the genus *Ameira*, as defined by Boeck. Two other well-defined species of the present genus have been recorded in Vol. V, and I now am enabled to add another species, to be described below.

52. *Stenocopia minor*, G. O. Sars, n. sp. (Pl. XLI).

Specific Characters.—*Female.* Body comparatively less slender than in the type species, with the anterior division slightly broader than the posterior. Cephalic segment about the length of the 3 succeeding segments combined, and projecting in front to a triangular rostral plate. Trunkal segments perfectly smooth. Urosome (including the caudal rami) fully as long as the anterior division and only slightly tapered behind, its segments minutely denticulate at the hind edge; genital segment of moderate size and imperfectly

subdivided in the middle; last segment considerably larger than the preceding one, with the anal opercle somewhat prominent and broadly rounded at the end. Caudal rami slender and narrow, though less elongated than in the other known species, scarcely exceeding in length the anal segment; apical setæ moderately slender. Anterior antennæ rather narrow, exceeding somewhat in length the cephalic segment, and composed of 9 well defined joints clothed with comparatively long curved setæ; 2nd joint the largest and about equalling in length the 2 succeeding joints combined; penultimate and antepenultimate joints very small, but distinctly defined. Posterior antennæ with the outer ramus narrow, biarticulate, and only provided with 2 setæ. Oral parts agreeing in structure with those in the other species. 1st pair of legs with the inner ramus very slender, being fully twice as long as the outer; terminal joint of the latter only armed with 4 spiniform setæ. The 3 succeeding pairs of legs exhibiting the slender form characteristic of the genus; inner ramus however comparatively shorter than in the other species, with the terminal joint less produced and the number of setæ somewhat reduced. Last pair of legs with the distal joint narrow oblong in form, and less exerted at the tip than in the other species; marginal setæ rather unequal in length and 5 in number; inner expansion of proximal joint comparatively broad, but only very slightly produced, and edged with 4 setæ, the outermost one very small.

Colour whitish grey.

Length of adult female 0.70 mm.

Remarks.—The present form is nearly allied to the type species, *S. longicaudata* (Scott), but is rather inferior in size, and moreover at once distinguished from that species by the comparatively less elongated caudal rami. In the structural details also some well-marked differences are found, as indicated in the above diagnosis.

Occurrence.—Some few female specimen of this form were taken at Risør from a depth of about 50 fathoms, muddy bottom.

Gen. *Cletomesochra*, G. O. Sars, n.

Generic Characters.—Body as a rule short and stout, with the anterior division more or less dilated. Cephalic segment of moderate size, and provided in front with a prominent triangular rostral plate defined behind by a well-marked transverse suture. Caudal rami small and widely apart. Anterior antennæ comparatively short and stout, being only composed of 5 joints partly

clothed with pectinate setæ, last joint large, conically produced at the end. Posterior antennæ with the outer ramus distinctly biarticulate. Mandibular palp likewise biarticulate, with the outer ramus small or wanting. Maxillæ with the exopodal lobe well defined, bisetose. 1st pair of legs with both rami 3-articulate, the inner one imperfectly prehensile, being far less produced than in *Mesochra*, and scarcely bent at the end; middle joint of outer ramus without any seta inside. The succeeding pairs of legs comparatively slender, with the outer ramus much longer than the inner, which is only composed of 2 joints. Last pair of legs with the distal joint more or less produced; inner expansion well developed.

Remarks.—This new genus is established to include the form described in Vol. V, p. 395, as *Mesochra exigua*. The rather aberrant characters of this small species were noted in that place, and it was therefore only with some doubt referred to the genus *Mesochra* of Boeck. Having now had an opportunity of examining some other forms agreeing pretty well in the more general characters with the above-mentioned species, I think that the establishment of the present genus may be fully justified. The most conspicuous differences from *Mesochra* are found in the structure of the anterior antennæ and in that of the 1st pair of legs. The generic name here proposed alludes to the agreement in structure of the anterior antennæ to those in some of the *Cletodidæ*. 3 new species referable to the present genus will be described below.

53. *Cletomesochra major*, G. O. Sars, n. sp.

(Pl. XLII).

Specific Characters.—*Female.* Body comparatively more slender than in the type species, with the anterior division only slightly broader than the posterior. Cephalic segment about the length of the 3 succeeding segments combined; rostral plate rather prominent and narrowly truncated at the tip. Urosome shorter than the anterior division and only very slightly tapered behind, its segments minutely denticulate at the hind edge; genital segment not fully attaining the length of the 2 succeeding segments combined; last segment nearly as large as the preceding one, with the anal opercle broadly rounded and perfectly smooth. Caudal rami very small, quadrangular in form, with the apical setæ comparatively short. Anterior antennæ scarcely exceeding half the length of the cephalic segment; the first 3 joints rather thick and gradually somewhat diminishing in size, the other 2, representing the terminal part of the antenna, very unequal in size, the proximal one being quite short,

the distal one large and conically produced at the end. Posterior antennæ with the basal part not subdivided, outer ramus provided with 4 setæ, 2 apical and 2 lateral. Mandibular palp comparatively small, with the proximal joint not expanded and without any trace of an outer ramus. 1st pair of legs with the inner ramus only slightly longer than the outer, and having all 3 joints of about equal length; terminal joint of outer ramus with only 2 spines and 2 geniculated setæ. The 3 succeeding pairs of legs agreeing in structure with those in the type species. Last pair of legs with the distal joint of comparatively smaller size, oblong oval in form, and having the edges nearly smooth, marginal setæ 5 in number; inner expansion of proximal joint rather broad and obtusely truncated at the end, extending beyond the middle of the distal joint; marginal setæ rather strong and successively increasing in length outwards.

Colour whitish grey.

Length of adult female 0.57 mm.

Remarks.—The present species is unquestionably congeneric with *C. exigua*, but of considerably larger size and somewhat more slender form of the body, differing moreover somewhat in the structure of the 1st and last pairs of legs, as also in the less perfectly developed mandibular palp.

Occurrence.—A solitary female specimen of this form was obtained last summer (1918) at Hvalør, outside the Christiania Fjord, from a depth of about 6 fathoms.

54. *Cletomesochra nana*, G. O. Sars, n. sp.

(Pl. XLIII).

Specific Characters.—*Female.* Body short and stout, resembling in shape that in the type species. Rostral plate somewhat less prominent than in *C. major*, but of a very similar form. Urosome much shorter than the anterior division, and of about equal width throughout. Caudal rami small, quadrangular in form, with the inner corner somewhat prominent. Anterior antennæ almost exactly of same appearance as in the preceding species. Posterior antennæ with the outer ramus slightly widening distally and carrying 5 setæ, 3 apical and 2 lateral. Mandibular palp with the basal part rather narrow, but having outside a well-marked small joint tipped with a ciliated seta and representing the rudimentary outer ramus. 1st pair of legs with the inner ramus distinctly longer than the outer, its middle joint shorter than either of the other 2, which are of about equal length. The 3 succeeding pairs of

legs exceedingly slender, with the terminal joint of outer ramus narrower than in the preceding species and almost as long as the other 2 combined. Last pair of legs with the distal joint narrow oblong in form and slightly tapered towards the end, 2 of the outer-edge setæ attached near the base of the joint at some distance from the 3 other setæ; inner expansion of proximal joint short and broad, transversely truncated at the end, and scarcely extending beyond the middle of the distal joint; marginal setæ rather slender, the outermost one the longest.

Colour not yet ascertained.

Length of adult female 0.41 mm.

Remarks.—This form is still more closely allied to the type species, and may on the first sight easily be confounded with it. It is however of smaller size and, on a closer examination, exhibits also some well-marked differences in the structural details, as indicated in the above diagnosis.

Occurrence.—Some few female specimens of this dwarfed species were picked up from samples taken at Risør in depths ranging from 30 to 50 fathoms.

55. *Cletomesochra rostrata*, G. O. Sars, n. sp.

(Pl. XLIV).

Specific Characters.—*Female.* Body moderately slender, with the anterior division conspicuously broader than the posterior. Cephalic segment comparatively large, occupying more than half the length of the anterior division; rostral plate greatly prominent and acutely produced at the end. Urosome somewhat shorter than the anterior division, with the segments rather sharply marked off from each other and distinctly spinulose at the hind edge; last segment of about same size as the preceding one and somewhat widening distally; anal opercle finely denticulate at the edge. Caudal rami oblong quadrangular in form, being somewhat longer than they are broad; apical setæ rather slender. Anterior antennæ of somewhat larger size than in the other species, though not nearly as long as the cephalic segment, 3rd joint remarkably produced at the end anteriorly. Posterior antennæ with the outer ramus of moderate size and carrying 4 setæ, 2 apical and 2 lateral. Mandibular palp with the basal part somewhat dilated and carrying outside a distinctly developed outer ramus. 1st pair of legs with the inner ramus slightly longer than the outer; terminal joint of the latter with 3 outer-edge spines. The 3 succeeding pairs of legs exceedingly slender, with the terminal joint of both rami narrow linear in form. Last pair of legs rather unlike those in the other species, distal joint narrow linear in form, with the 2 outermost setæ much

longer than the other 3; inner expansion of proximal joint narrowly produced at the end and extending about to the middle of the distal joint; marginal setæ only 4 in number.

Colour not yet ascertained.

Length of adult female 0.67 mm.

Remarks.—This is a very distinct and easily recognisable form, differing conspicuously from the other species both in the outward appearance and in the structure of some of the appendages, though, according to the structure of the antennæ and of the 1st pair of legs, apparently referable to the present genus.

Occurrence.—A solitary female specimen of this form was found in a sample taken at Risør from a depth of about 50 fathoms.

Gen. *Hemimesochra*, G. O. Sars, n.

Generic Characters.—Body sub-clavate in form, being conspicuously tumefied in its anterior part and attenuated behind. Rostral plate small and deflexed, not sharply defined behind. Segments of urosome coarsely spinulose at the hind edge. Caudal rami of moderate size. Anterior antennæ short and stout, 5-articulate, with some of the setæ on the proximal part coarsely pectinate, last joint comparatively large, but not conically produced at the end and with some of the setæ ciliated. Posterior antennæ with the outer ramus very small, uniarticulate. Mandibles very strong, with the cutting edge imperfectly dentate; palp well developed, but without any distinctly defined outer ramus. Maxillæ with the exopodal lobe obsolete. 1st pair of legs not prehensile, the inner ramus being very short and only composed of 2 joints. The 3 succeeding pairs of legs of a structure similar to that in *Mesochra*. Last pair of legs likewise built on the same type as in that genus, the distal joint being very small, not produced at the end.

Remarks.—This new genus is only founded on a single species, which however exhibits certain peculiarities in the structural details forbidding its reception into any of the known genera of the present family, though in some respects it would seem to approach somewhat the genus *Cletomesochra*.

56. *Hemimesochra clavularis*, G. O. Sars, n. sp.

(Pl. XLV).

Specific Characters.—*Female.* Body moderately slender, with the anterior division conspicuously inflated in front, almost clavate in form. Cephalic segment large and tumid, evenly rounded in front, with the rostral plate abruptly deflexed, so as not being visible in the dorsal view of the animal. Urosome comparatively narrow and somewhat shorter than the anterior division, with the segments sharply marked off from each other and distinctly spinulose at the hind edge, the spinules being arranged in small groups; last segment nearly as large as the preceding one, and having the anal opercle small and perfectly smooth. Caudal rami about the length of the anal segment and somewhat divergent, edges partly spinulose; apical setæ of moderate length. Anterior antennæ scarcely half as long as the cephalic segment, with the first 2 joints comparatively short and combined scarcely longer than the 3rd; last joint rather large and clothed with long and slender setæ. Posterior antennæ with the basal part distinctly subdivided, outer ramus carrying 3 setæ, 2 apical and one lateral. Mandibular palp with the basal joint rather large, though not much expanded, and provided in the middle of the outer edge with a strong ciliated seta replacing the outer ramus. 1st pair of legs much smaller than the succeeding pairs, with the inner ramus scarcely extending beyond the middle of the terminal joint of the outer, its proximal joint somewhat expanded and carrying inside the usual ciliated seta, distal joint of about same length, but much narrower, and armed at the tip with a strong spine accompanied inside by 2 unequal setæ; outer ramus without any setæ inside, terminal joint with only 2 outer-edge spines. The 3 succeeding pairs of legs well developed, with the inner ramus somewhat exceeding half the length of the outer and resembling in shape that in *Mesochra*. Last pair of legs with the distal joint very small, sub-quadrangular in form, and only provided with 4 setæ, the innermost of which is much elongated, the other 3 comparatively short; inner expansion of proximal joint extending far beyond the distal joint and obtusely truncated at the end; marginal setæ 4 in number and of very unequal length, the outermost but one much the largest.

Colour not yet ascertained.

Length of adult female 0.53 mm.

Remarks.—The present form may be easily recognised from any of the other known *Canthocamptidæ* by the peculiar clavate shape of the body, a character which has given rise to the specific name here proposed.

Occurrence.—Two female specimens only of this peculiar form have as yet come under my notice. They were taken at Risør from a depth of about 50 fathoms, muddy bottom.

Fam. Laophontidæ.

Gen. Laophonte, Philippi.

57. *Laophonte brevifurca*, G. O. Sars, n. sp.

(Pl. XLVI).

Specific Characters.—*Female.* Body moderately slender and slightly attenuated behind, with all the segments well marked off from each other. Cephalic segment nearly half the length of the anterior division; rostral prominence comparatively short, triangular, and obtusely pointed at the end. Urosome shorter than the anterior division, and having the lateral expansions of the anterior segments well marked and densely spinulose at the edge; last segment about twice as broad as it is long, anal opercle rounded and distinctly denticulate at the edge. Caudal rami very short, being scarcely longer than they are broad at the base; apical setæ of moderate length. Anterior antennæ comparatively short and only composed of 6 joints, the last 2 being confluent; 2nd joint rather broad, of rounded form, and without any projection of the outer edge. Posterior antennæ and oral parts of normal structure. 1st pair of legs less strongly developed than usual, with the outer ramus distinctly 3-articulate and extending beyond the middle of the proximal joint of the inner. The 3 succeeding pairs of legs with the inner ramus scarcely half as long as the outer, and only provided with 3 setæ at the end. Last pair of legs with the distal joint comparatively small, narrow sub-quadrangular in form, and carrying 5 marginal setæ, all issuing from the nearly transversely truncated end, one of the setæ (the innermost but one) much longer than the others; inner expansion of proximal joint rather produced, extending almost as far as the distal joint; marginal setæ 4 in number.

Colour whitish grey, with a faint yellow tinge.

Length of adult female 0.70 mm.

Remarks.—The above-described form, though not exhibiting any more prominent peculiarity in its structure, does not agree fully with any of the

numerous species of the present genus as yet known. It may be best recognised by the very small size of the caudal rami, a character which indeed has given rise to the specific name here proposed.

Occurrence.—A solitary female specimen of this form was found last summer (1918) at Hvalør, outside the Christiania Fjord, in a depth of about 6 fathoms.

58. *Laophonte tenera*, G. O. Sars, n. sp.
(Pl. XLVII).

Specific Characters.—*Female.*—Body rather slender and narrow, rapidly tapered behind, with the segments sharply marked off from each other. Cephalic segment large and tumid, occupying fully half the length of the anterior division; its postero-lateral corners produced in a peculiar manner and curved upwards; rostral projection rather prominent, triangular, and minutely bilobular at the tip. Urosome almost as long as the anterior division, and having the lateral expansions of the segments rather prominent and densely spinulose at the edges; last segment scarcely broader than it is long and slightly widening distally, anal opercle finely denticulate at the edge. Caudal rami about twice as long as they are broad and considerably divergent; apical setæ of moderate length. Anterior antennæ more slender than in the preceding species, though not nearly attaining the length of the cephalic segment, and composed of 7 well defined joints; 2nd joint the largest and oblong oval in form, with a very small prominence of the outer margin. Posterior maxillipeds comparatively larger than in the preceding species. 1st pair of legs likewise more powerfully developed; outer ramus however rather small, not extending to the middle of the proximal joint of the outer, and only composed of 2 joints. The 3 succeeding pairs of legs of normal structure. Last pair of legs with the distal joint well developed, broadly spatulate in form, and provided with 5 marginal setæ, the innermost but one the longest and issuing from a digitiform process of the joint; inner expansion of proximal joint short and broad, obtusely rounded, and not extending to the middle of the distal joint; marginal setæ 4 in number.

Male of smaller size than female and having the anterior antennæ very strongly hinged. 2nd pair of legs with one of the setæ attached to the distal joint of the inner ramus transformed in a similar manner to that found in *L. brevirostris* and allied species. 3rd pair of legs, as usual, much more strongly built than in female, with the inner ramus distinctly 3-articulate and

having the middle joint acutely produced at the end outside. Last pair of legs much reduced in size, distal joint rather narrow and only provided with 4 setæ; inner expansion of proximal joint obsolete.

Colour not yet ascertained.

Length of adult female 0.60 mm.

Remarks.—This form seems to be nearest allied to *L. macera* G. O. Sars, but is of somewhat larger size, and moreover at once distinguished by the less elongated caudal rami. The shape of the last pair of legs is also rather different.

Occurrence.—Several specimens of this form, both males and females, were picked up from samples taken at Korshavn at depths ranging from 30 to 50 fathoms.

59. *Laophonte abbreviata*, G. O. Sars, n. sp.

(Pl. XLVIII).

Specific Characters.—*Female*. Body quite unusually short and stout, and pronouncedly depressed in its anterior part. Cephalic segment of very large size, far exceeding in length the remaining part of the trunk, being broadest behind and gradually somewhat contracted in front; rostral projection rather prominent and somewhat blunted at the end, which appears slightly bilobular. Urosome somewhat tapered behind, and about the length of the cephalic segment; lateral expansions of the segments comparatively small, but well defined and densely spinulose at the edges; last segment, as usual, not expanded and about twice as broad as it is long; anal opercle distinctly denticulate at the edge. Caudal rami of moderate size, about the length of the anal segment, and somewhat divergent; apical setæ rather slender. Anterior antennæ moderately long and composed of 7 well defined joints, the 2nd of which is the largest and oval in form, without any distinct projection of the outer edge. Posterior antennæ with the outer ramus normally developed, somewhat widening distally and provided with 4 subequal ciliated setæ. Posterior maxillipeds rather powerful. 1st pair of legs likewise comparatively strongly built, with the outer ramus distinctly 3-articulate; and extending considerably beyond the middle of the proximal joint of the inner. The 3 succeeding pairs of legs of normal structure. Last pair of legs, however, rather peculiar; distal joint comparatively large and almost perfectly orbicular in outline, carrying 6 rather short setæ, 2 of which are attached somewhat inside the edge; inner expansion of proximal joint quite short, with 5 marginal setæ, the outermost one very small.

Copepoda

Suppl. Volume

Idyæidæ

Pl. XXXIII



G. O. Sars, del.

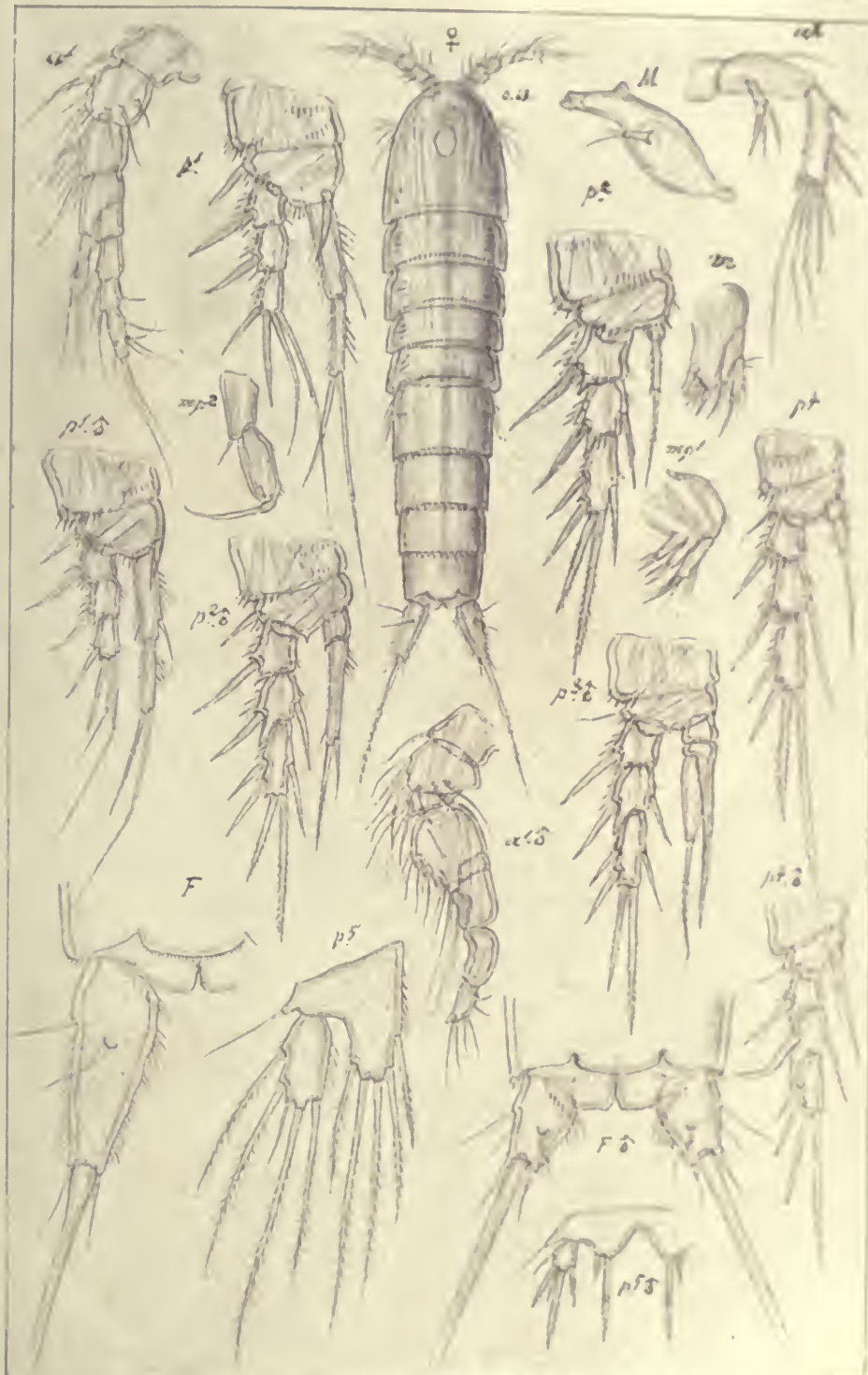
1. *Idyella major*, G. O. Sars
2. „ *exigua*, G. O. Sars
3. *Idyanthe dilatata*, G. O. Sars

Copepoda

Canthocamptidae

Suppl. Volume

Pl. XXXV



G. O. Sars, del.

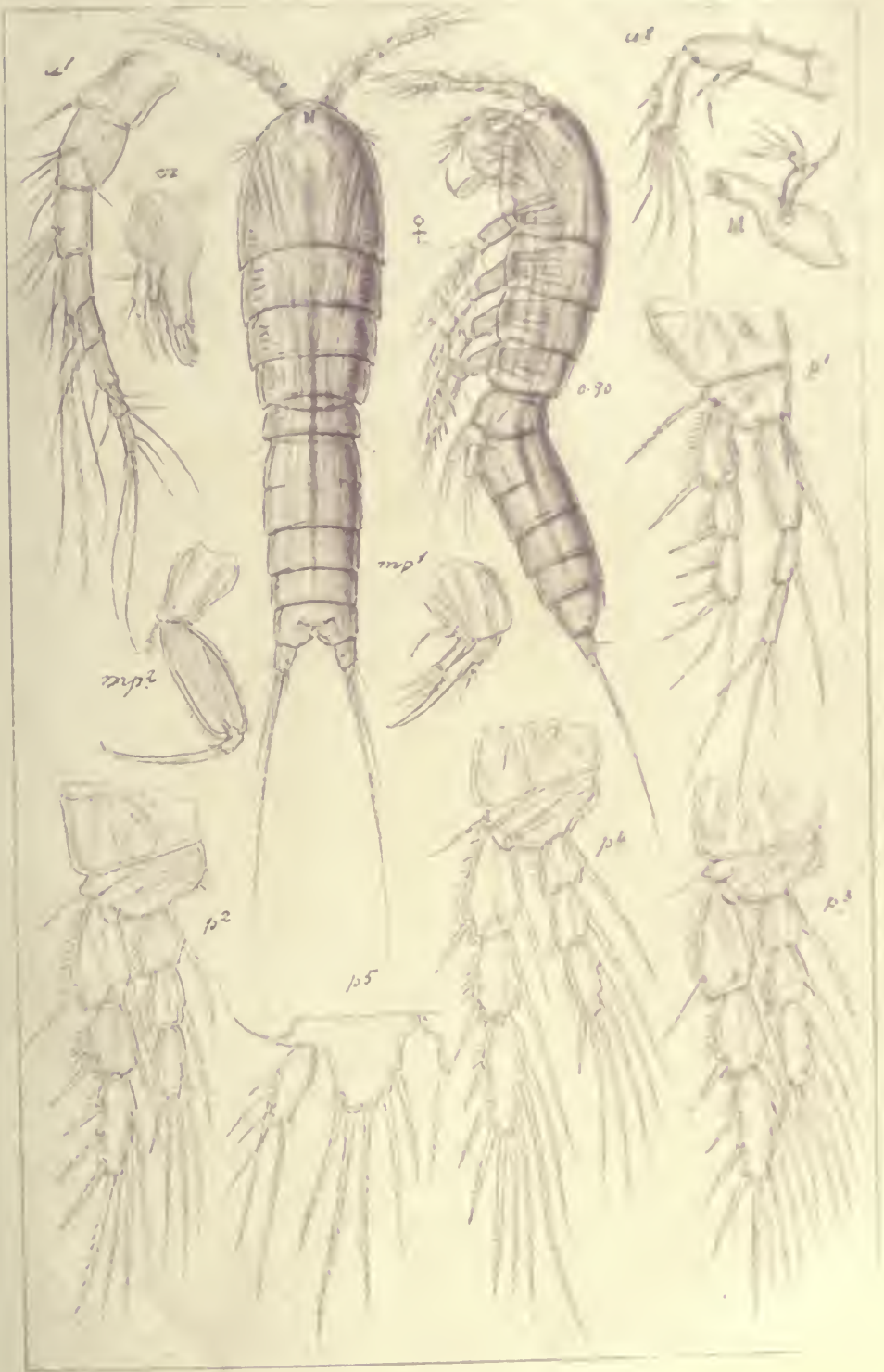
Attheyella Schmeili (Mrázek)

Copepoda

Canthocamptidae

Suppl. Volume

PL. XXXVI



G. O. Sars, del.

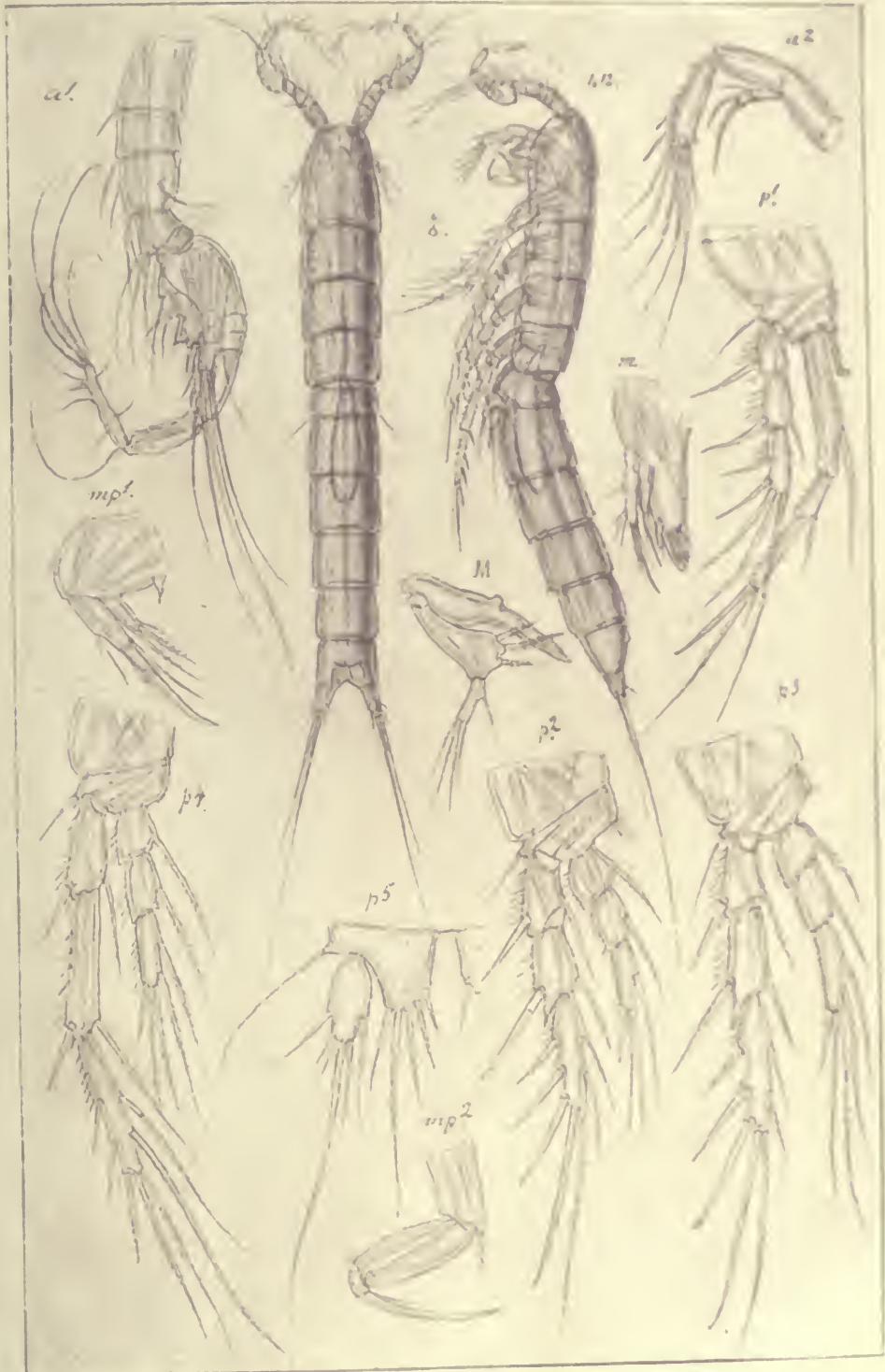
Ameira dubia, G. O. Sars

Copepoda

Canthocamptidae

Suppl. Volume

Pl. XXXVII



G. O. Sars, del.

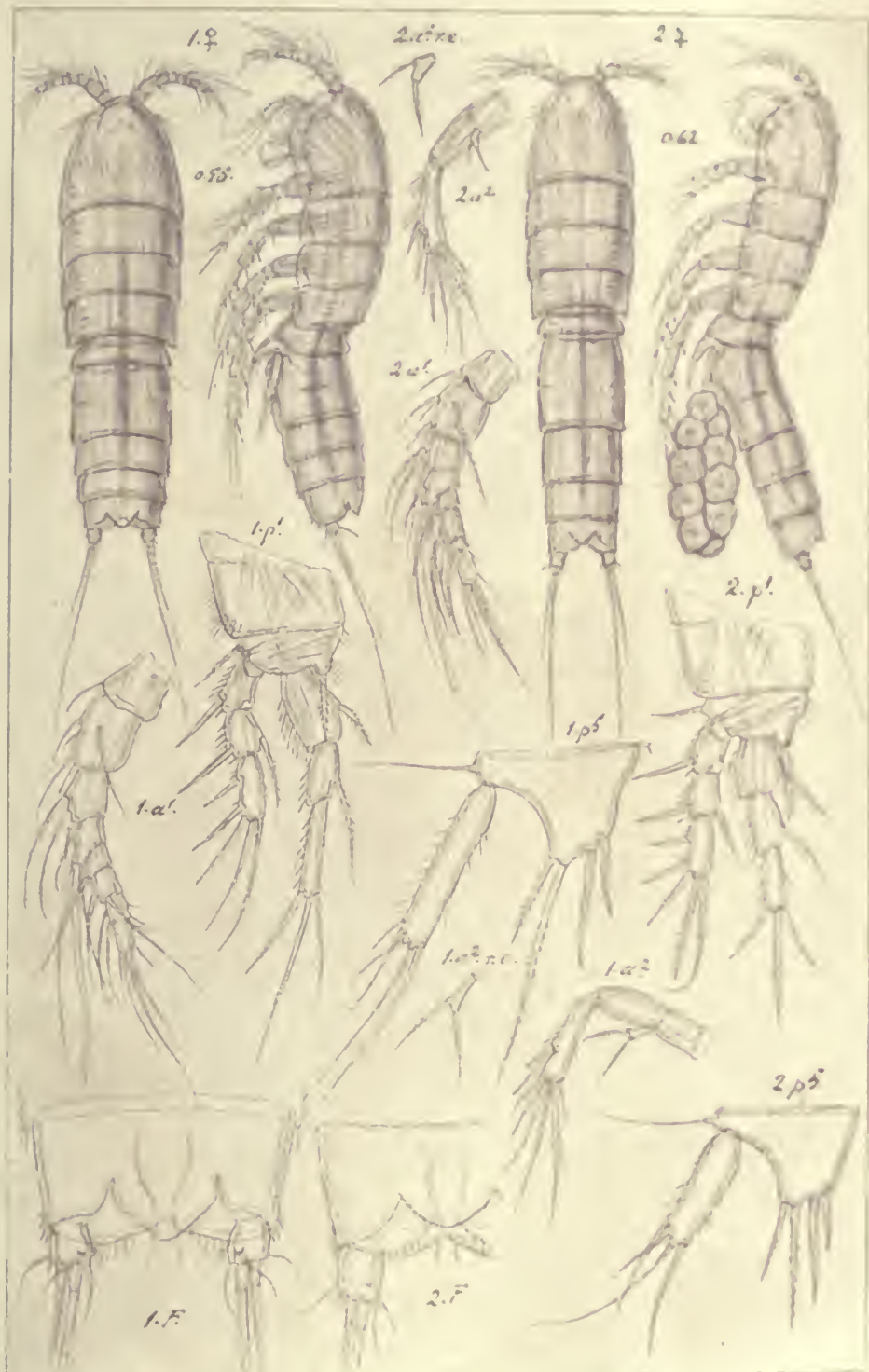
Ameira exilis, Scott

Copepoda

Canthocamptidae

Suppl. Volume

Pl. XXXVIII



G. O. Sars, del.

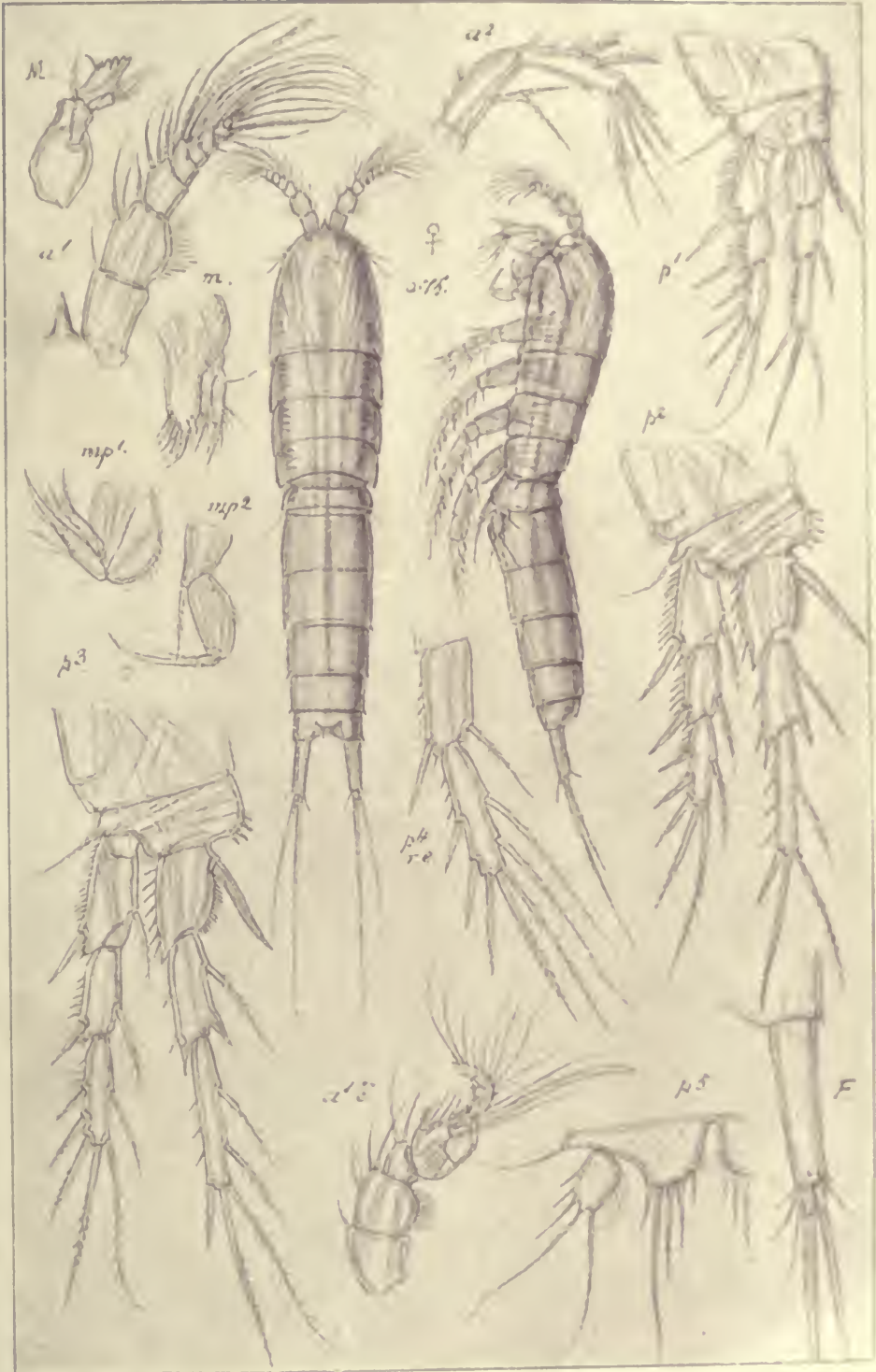
1. *Parameira longiremis* (Scott)
2. " *intermedia* (Scott)

Copepoda

Canthocamptidae

Suppl. Volume

Pl. XXXIX



G. O. Sars, del.

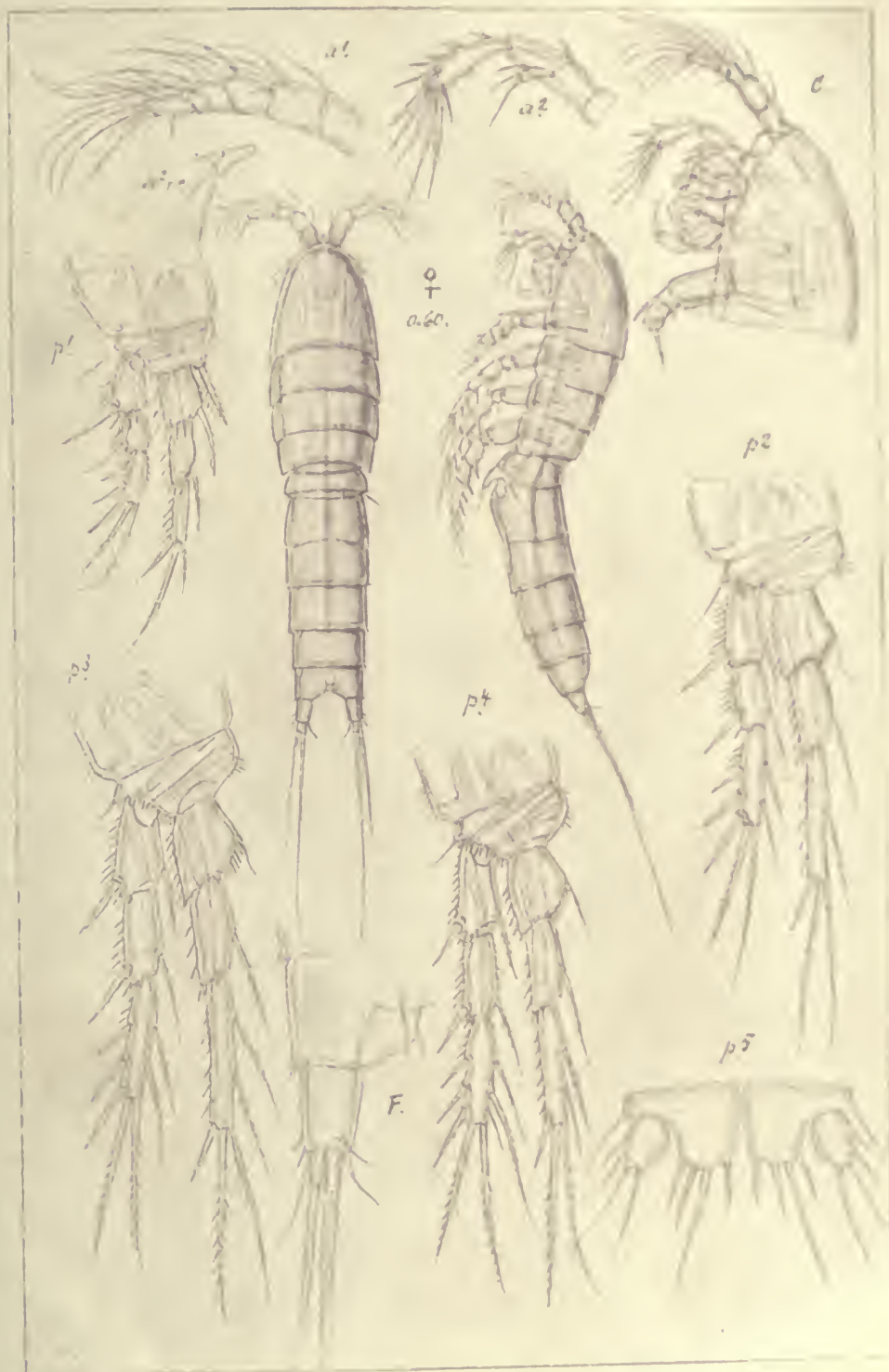
Pseudameira gracilis, G. O. Sars

Copepoda

Canthocamptidae

Suppl. Volume

PL XL



G. O. Sars, del.

Pseudameira mixta, G. O. Sars

Copepoda

Canthocamptidae

Suppl. Volume

Pl. XLI



G. O. Sars, del.

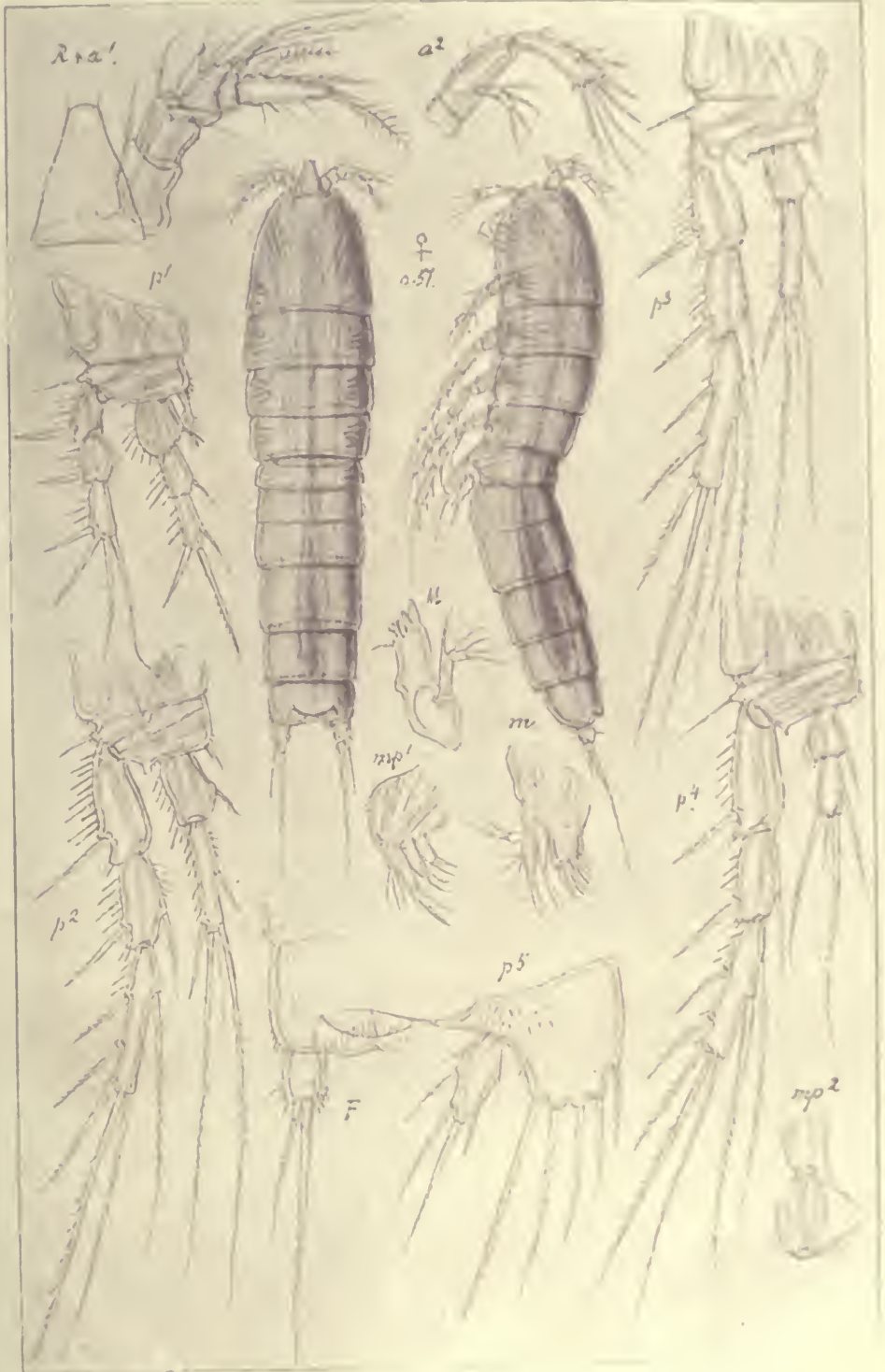
Stenocopia minor, G. O. Sars

Copepoda

Canthocamptidae

Suppl. Volume

Pl. XLII



G. O. Sars, del.

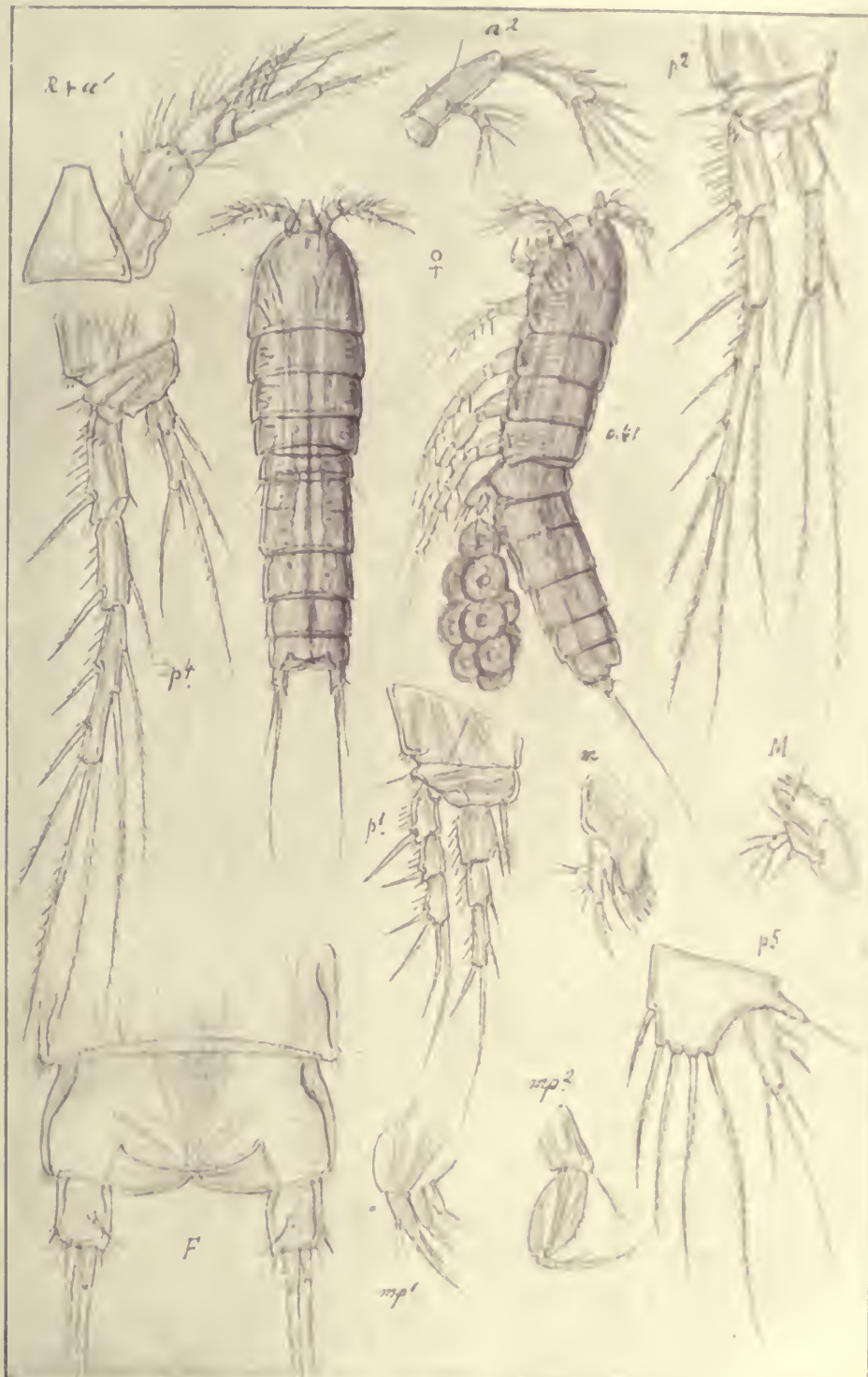
Cletomesochra major. G. O. Sars

Copepoda

Canthocamptidae

Suppl. Volume

Pl. XLIII

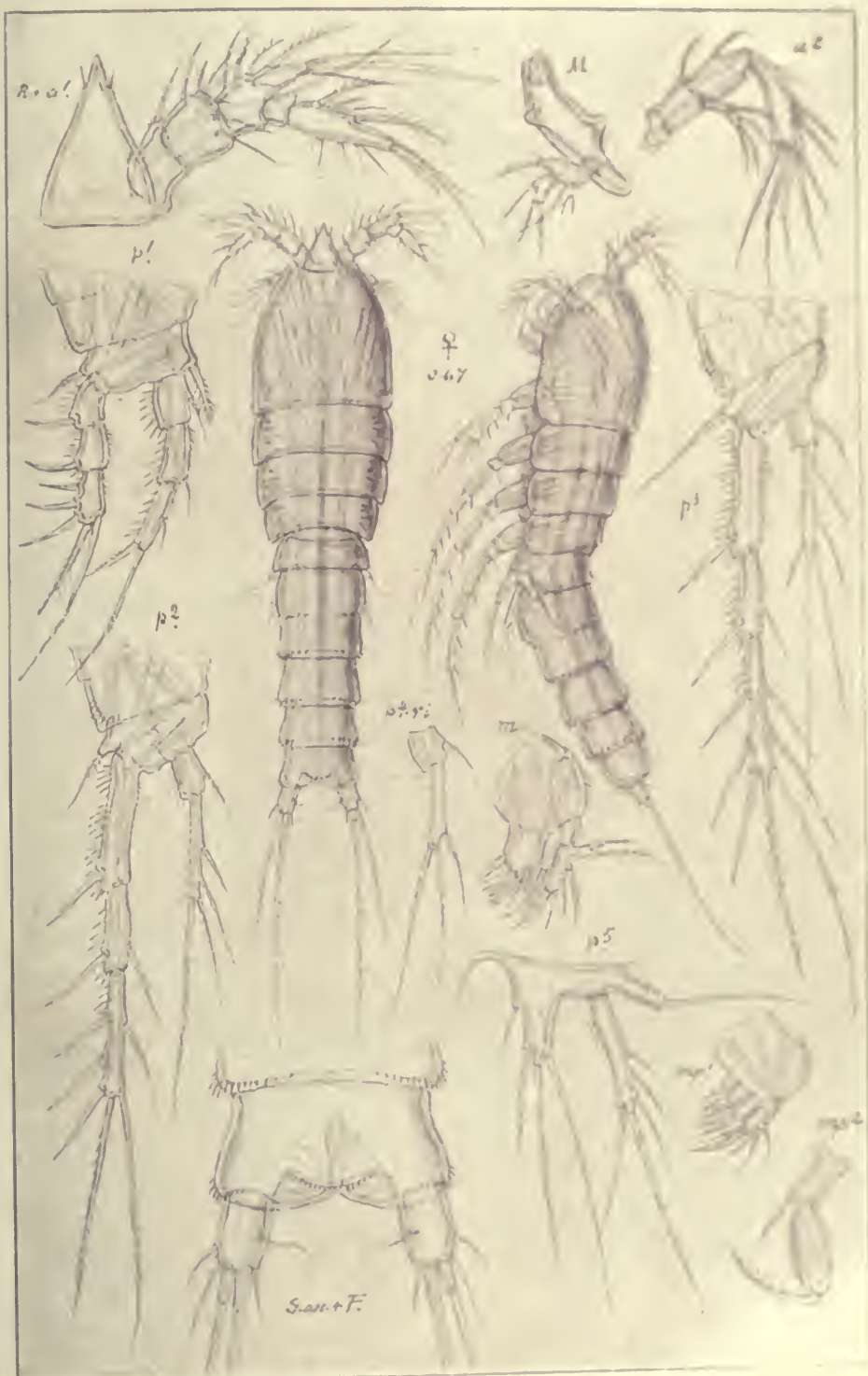


G. O. Sars, del.

Cletomesochra nana, G. O. Sars

Suppl. Volume

PL XLIV



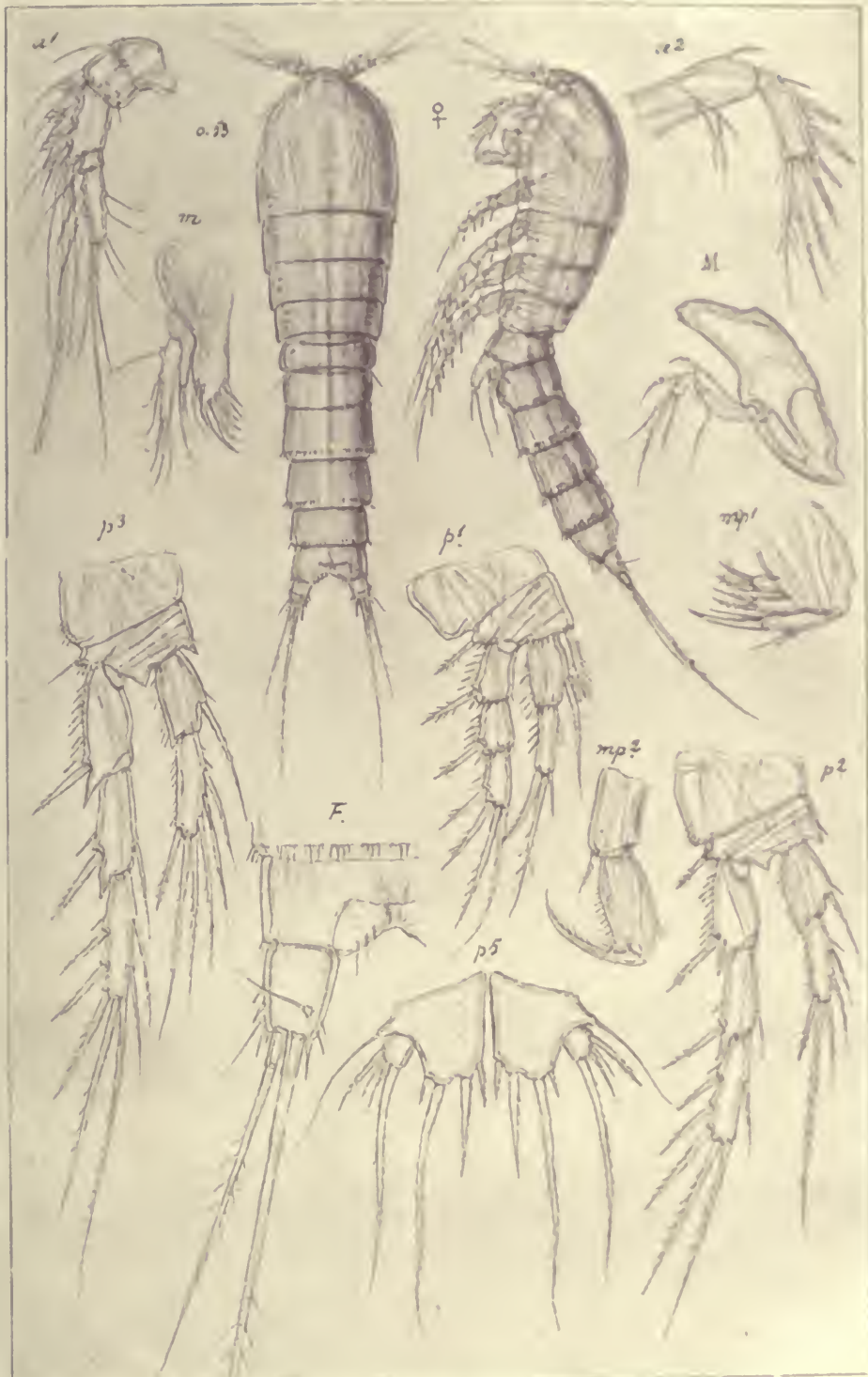
Cletomesochra rostrata, G. O. Sars

Copepoda

Canthocamptidae

Suppl. Volume

Pl. XLV



G. O. Sars, del.

Hemimesochra clavularis, G. O. Sars

Copepoda

Laophontidae

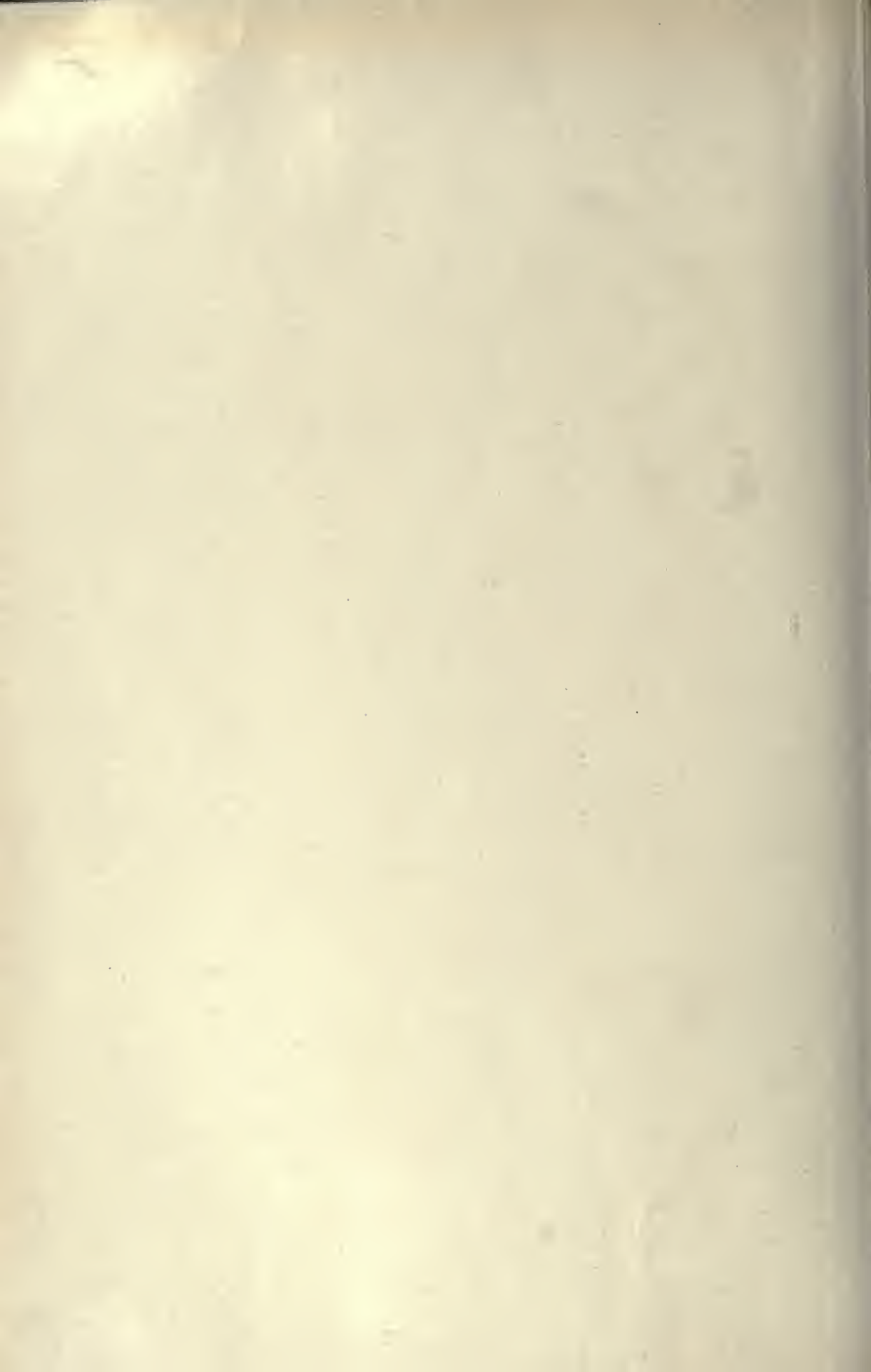
Suppl. Volume

PL XLVI



G. O. Sars, del.

Laophonte brevifurca, G. O. Sars

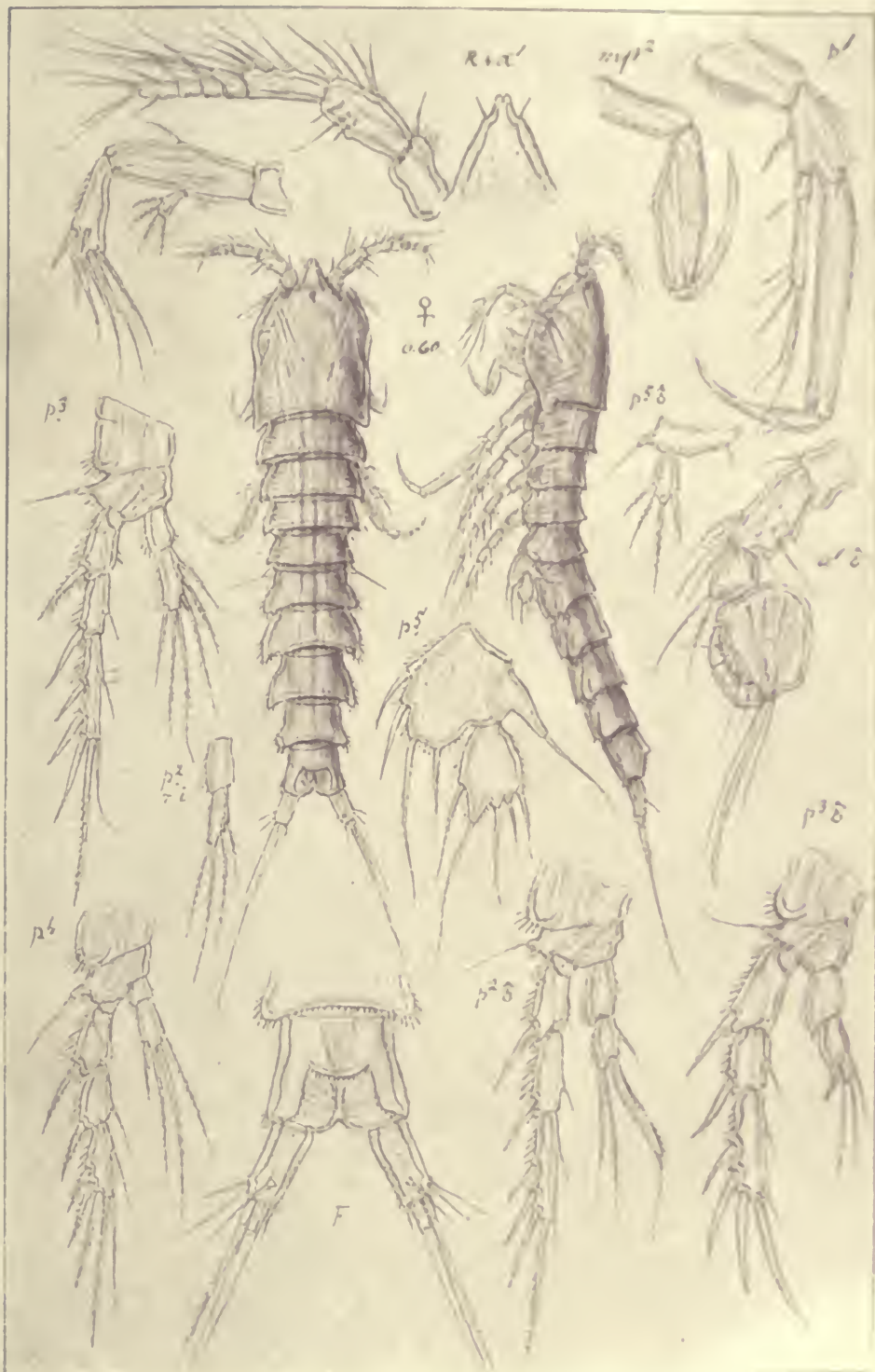


Copepoda

Laophontidæ

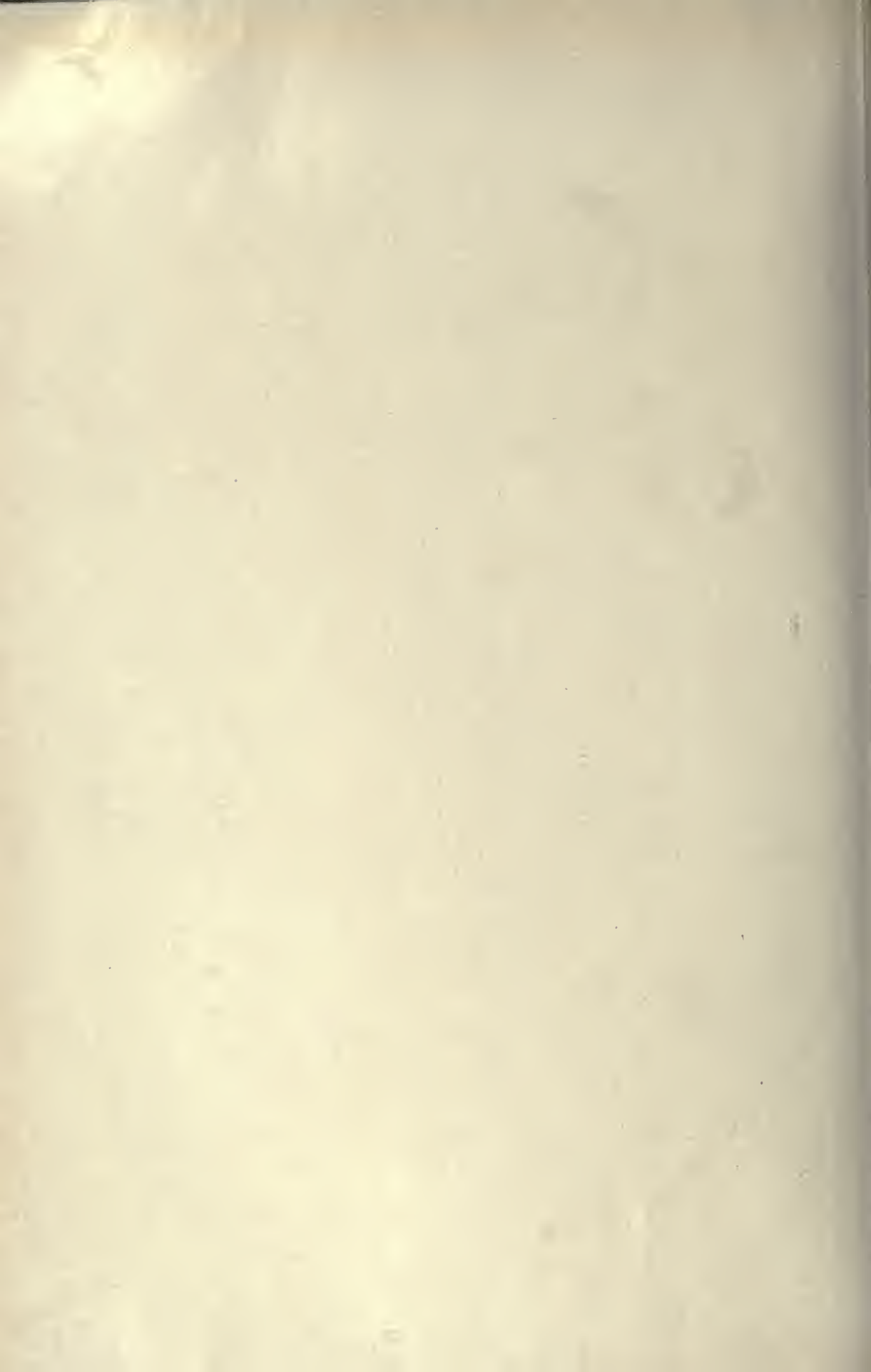
Suppl. Volume

PL XLVII



G. O. Sars, del.

Laophonte tenera, G. O. Sars

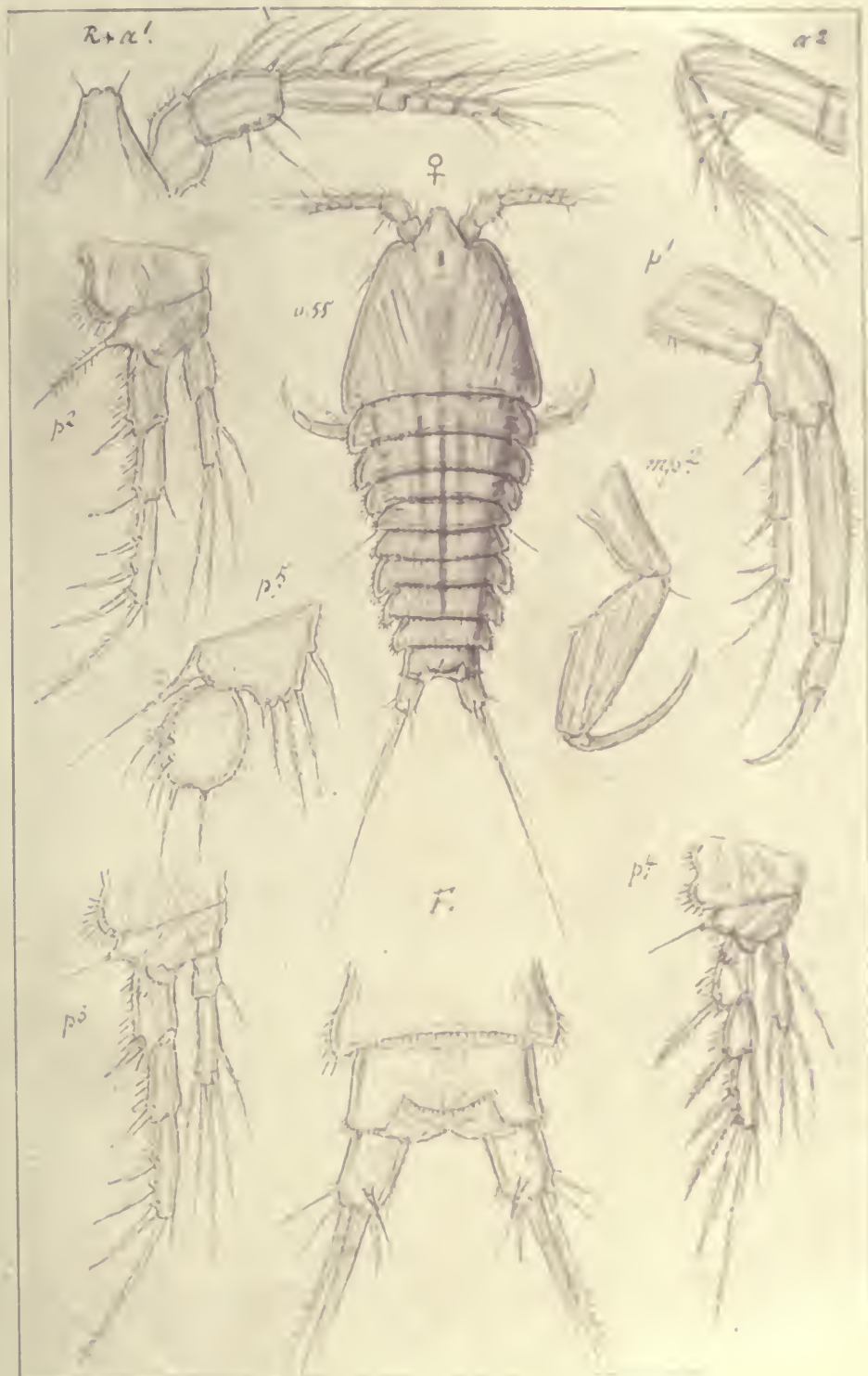


Copepoda

Laophontidæ

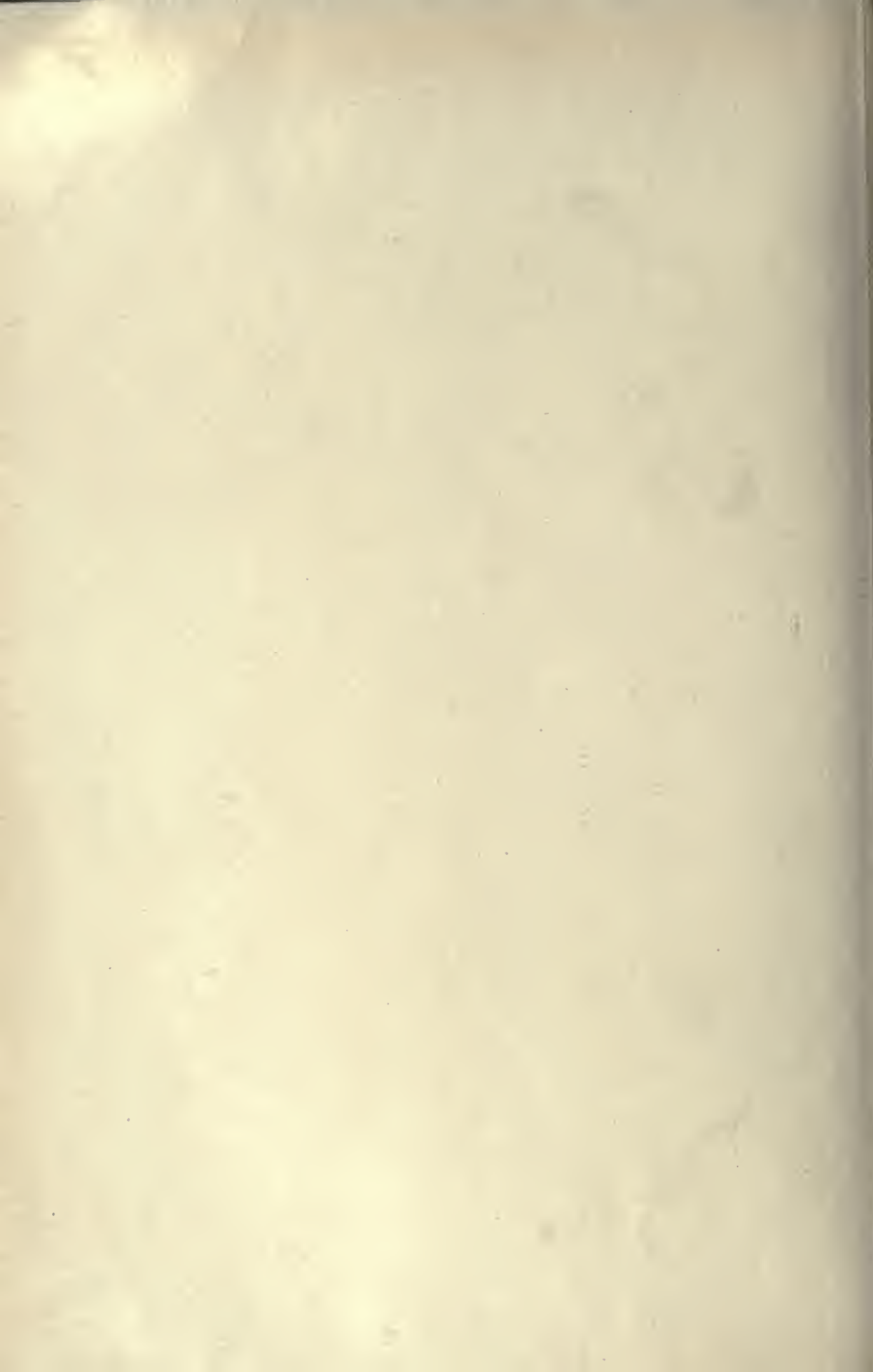
Suppl. Volume

Pl. XLVIII



G. O. Sars, del.

Laophonte abbreviata, G. O. Sars



Colour not yet ascertained.

Length of the specimen examined 0.55 mm.

Remarks. This form may at once be distinguished from any of the other known species by its quite unusually short and stout body. In the structural details it seems to come nearest to *L. littoralis* Scott, described in Vol. V, p. 255. On a closer comparison, however, some well marked differences are found to exist, especially as regards the outer ramus of the posterior antennæ and the 1st and last pairs of legs.

Occurrence.—A solitary, apparently fully grown female specimen of this form was found in a sample taken at Korshavn from a depth of about 30 fathoms.

Gen. *Harrietella*, Scott, 1906.

Generic Characters.—Body short and stout, with the anterior division pronouncedly depressed, the posterior much narrower. Rostral projection well defined and ciliated at the tip. Caudal rami comparatively short. Antennæ and oral parts built on the same type as in *Laophonte*. The 3 anterior pairs of legs likewise of a very similar structure. 4th pair of legs, however, peculiarly developed, and much smaller than the 2 preceding pairs, with the number of joints in both rami reduced. Last pair of legs extended laterally; distal joint large, lamellar, proximal joint short and only very slightly expanded inside. 2 ovisacs present in female.

Male unknown.

Remarks.—This genus was established in the year 1906 by Scott, to include a form previously described by him as a species of the genus *Laophonte*. Indeed, the affinity of this form to that genus is a very close one. Yet there are at least 2 characters which highly distinguish the present genus, and which alone seem to suffice for warranting its validity, viz., the peculiar structure of the 4th pair of legs and the presence in the female, as stated by Scott, of 2 ovisacs. Only a single species of this genus is as yet known.

60. *Harrietella simulans*, Scott.

(Pl. XLIX).

Laophonte simulans, Scott, Twelfth Annual Report of the Fishery Board for Scotland, Part III, p. 248, Pl. VII, figs. 24–32; Pl. VIII, fig. 1.

Specific Characters.—*Female.* Body remarkably short and broad, with the anterior division flattened. Cephalic segment very large and expanded.

occupying more than half the length of the anterior division, lateral edges finely ciliated; rostral projection rather prominent, with the tip narrowly rounded off and fringed with delicate cilia between the 2 usual sensory hairs. The 2 succeeding segments with the lateral parts lamellarly expanded and finely ciliated at the edges; the 3rd trunkal segment somewhat less broad, with the epimeral plates less fully developed; last segment very short. Urosome scarcely more than half as long as the anterior division and much narrower, tapered behind; genital segment nearly twice as broad as it is long and distinctly subdivided in the middle; the succeeding segments without any distinctly defined lateral expansions, but, like the genital segment, ciliated at the edges; last segment scarcely smaller than the preceding one and having the anal opercle well developed and minutely denticulate at the edge. Caudal rami about the length of the anal segment and somewhat divergent; apical setæ moderately elongate. Anterior antennæ rather slender, though not attaining the length of the cephalic segment, and composed of 6 joints clothed with scattered rather long setæ; 2nd joint somewhat dilated, but scarcely as long as the 3rd. Posterior antennæ comparatively strongly built, with the spines attached to the terminal joint very coarse and somewhat curved at the tip; outer ramus small, uniarticulate, with 4 ciliated setæ. Posterior maxillipeds very powerfully developed. 1st pair of legs also rather strongly built, with the inner ramus large and armed at the end with an unusually strong curved claw; outer ramus very narrow, 3-articulate, and extending a little beyond the middle of the proximal joint of the inner. The 2 succeeding pairs of legs of rather normale appearance. 4th pair of legs very unlike the preceding pairs and much smaller, 2nd basal joint produced outside to a long digitiform process ciliated on both edges and carrying on the tip the usual slender bristle; outer ramus only composed of 2 joints, the proximal of which is the shorter and provided outside with a thickish densely ciliated seta, distal joint of a somewhat irregular form and edged with 5 setæ similar to that attached to the proximal joint, each seta springing off from a knob-like prominence of the edge; inner ramus composed of a single small joint carrying on the tip 2 setæ. Last pair of legs with the proximal joint quite short and produced outside to a slender process tipped with a bristle, its inner part only very slightly expanded and provided with 3 marginal setæ of about equal length; distal joint remarkably constricted at the base, but widening in its outer part to a broad hairy plate carrying 5 comparatively short marginal setæ.

Colour not yet ascertained.

Length of adult female 0.51 mm.

Remarks.—The outward appearance of the present form is so peculiar that it cannot be confounded with any other member of the family *Laophontidae*, though there are a few species which exhibit a somewhat similar short and flattened shape of the body, for instance the form described in Vol. V, p. 273 as *Laophontodes expansus*. This form is however otherwise very different.

Occurrence.—A single female specimen only of this peculiar form has hitherto come under my notice. It was found in the bottom residue of a large collecting bottle containing several marine animals taken by Mr. Kjær in the neighbourhood of Drøbak from a depth of about 50 fathoms. The specimen was fully grown, but wanted the ovisacs.

Distribution.—Scottish coast.

Fam. Cletodidæ.

Gen. Cletodes, Brady.

61. *Cletodes Sarsi*, Scott.

(Pl. L).

Cletodes Sarsii, Scott; Twenty-third Annual Report of the Fishery Board for Scotland, Part III, p. 146, Pl. XII, figs. 1—9.

Specific Characters.—*Female.* Body very slender and gradually tapered behind, with all the segments sharply marked off from each other. Cephalic segment comparatively large, equalling in length the 3 succeeding segments combined; rostral projection rather prominent and narrowly blunted at the tip. Urosome (including the caudal rami) nearly as long as the anterior division; genital segment not fully attaining the length of the 2 succeeding segments combined, and imperfectly subdivided in the middle; last segment comparatively small, with the anal opercle well marked and perfectly smooth. Caudal rami very slender and narrow, equalling about half the length of the remaining part of the tail, and slightly divergent; outer edge exhibiting at the end of the first $\frac{1}{3}$ of its length a well-marked notch, to which are attached 2 somewhat unequal bristles, another small bristle occurring near the end; dorsal seta issuing about in the middle; apical seta rather slender and flanked by 2 small bristles, the outer of which is partly connected with it at the base. Anterior antennæ comparatively short and stout, scarcely exceeding half the length of

the cephalic segment, and composed of 5 joints, the 2nd of which is the largest and much longer than the 3rd; terminal joint oblong oval in form, with some of the setæ distinctly ciliated. Posterior antennæ and oral parts of the structure characteristic of the genus. Natatory legs rather poorly developed and not very dissimilar in structure; inner ramus in all of them considerably shorter than the outer and biarticulate; outer ramus without any setæ inside. Last pair of legs with the distal joint long and narrow, sublinear in form, and provided with 4 marginal setæ, 2 on the outer edge, one at the tip, and one on the inner edge, the latter very strong, spiniform; inner expansion of proximal joint forming a well defined narrow plate edged with 3 strong setæ and extending about to the end of the first $\frac{1}{3}$ of the distal joint.

Male resembling the female in the general form of the body, but easily recognisable by the strongly hinged anterior antennæ. Inner ramus of 3rd pair of legs conspicuously transformed, being distinctly 3-articulate with the middle joint armed at the end outside with a strong spine; terminal joint small, with 2 slender setæ on the tip.

Colour not yet ascertained.

Length of adult female 0.62 mm.

Remarks.—The present species is easily recognised by the very slender and attenuated shape of the body, and more particularly by the structure of the last pair of legs and that of the caudal rami.

Occurrence.—Some few specimens of this form were picked up from samples taken at Risør and Korshavn in depths ranging from 30 to 60 fathoms

Distribution.—Scottish coast (Scott).

62. *Cletodes pusillus*, G. O. Sars, n. sp.

(Pl. LI).

Specific Characters.—*Female.* Body of a similar slender and narrow shape to that in the preceding species, though somewhat less rapidly attenuated behind. Cephalic segment scarcely attaining the length of the 3 succeeding segments combined, and having the rostral projection less produced and blunted at the end. Urosome almost the length of the anterior division and nearly cylindrical in shape, with the last segment scarcely smaller than the preceding one. Caudal rami long and narrow, nearly attaining half the length of the remaining part of the tail; outer edge with a slight notch in front of the middle carrying a small bristle; dorsal seta issuing a little beyond this notch; apical seta about the length of the ramus. Anterior antennæ comparatively

more slender than in the preceding species, though scarcely as long as the cephalic segment; 2nd joint of about same length as the 3rd, but somewhat broader. Posterior antennæ with the outer ramus very narrow and only provided with a single seta issuing from the tip. Natatory legs comparatively more slender than in *C. Sarsi*, with the setæ of the inner ramus reduced in number. Last pair of legs with the distal joint less slender, oblong fusiform in outline, and carrying 5 marginal setæ, 2 on the outer edge, 2 on the tip, and one inside near the end, none of the setæ spiniform; inner expansion of proximal joint very small, nodiform, with only 2 unequal setæ; digitiform process issuing from same joint outside exceedingly long and slender.

Male exhibiting the usual sexual differences from the female, the anterior antennæ being conspicuously hinged, and the inner ramus of 3rd pair of legs transformed in a similar manner to that in the preceding species.

Colour not yet ascertained.

Length of adult female 0.51 mm.

Remarks.—In the slender and narrow shape of the body this form resembles somewhat *C. Sarsi*. It is however rather inferior in size and, on a closer comparison, exhibits also several well-marked differences in the structural details, as indicated in the above diagnosis.

Occurrence.—Of this form also only a small number of specimens have as yet come under my notice. They were found in samples taken at Risør from a depth of about 60 fathoms.

63. *Cletodes leptostylis*, G. O. Sars.

(Pl. LII).

? Syn: *Cletodes longicaudata*, Brady (not Boeck).

Specific Characters.—*Female.* Body slender and attenuated, with the segments sharply marked off from each other. Cephalic segment about the length of the 3 succeeding segments combined; rostral projection of moderate size and terminating in 2 minute juxtaposed denticles. Urosome considerably exceeding in length the anterior division, and rapidly tapered behind; genital segment comparatively large and distinctly subdivided in the middle; last segment much smaller than the preceding one. Caudal rami exceedingly narrow and elongated, occupying more than $\frac{1}{3}$ of the entire length of the body; outer edge with a well-marked notch near the base carrying 2 well-developed bristles and with another smaller bristle close to the end; dorsal seta attached considerably in front of the middle; apical seta shorter than the ramus, and,

as usual, flanked by 2 small bristles, the outer of which is connected with it at the base. Anterior antennæ of moderate size, not fully attaining the length of the cephalic segment, with the first 2 joint comparatively short and combined scarcely longer than the 3rd. Posterior antennæ with the outer ramus very small, bisetose. Natatory legs moderately slender, with the inner ramus in 1st pair nearly as long as the outer, in the succeeding pairs much shorter; outer ramus in the 2 anterior pairs without any setæ inside, in the 2 posterior pairs with a well developed seta on the middle joint and 2 such setæ inside the terminal joint, the latter joint unusually prolonged, exceeding in length the other 2 combined. Last pair of legs largely developed and highly chitinised; distal joint much elongated and provided with 5 exceedingly strong and densely plumose setæ, 3 on the outer edge, one at the tip, and one on the inner edge near the end, each seta being attached to a well defined knob-like prominence; proximal joint with the outer digitiform process long and narrow, inner expansion of the joint produced in the form of a narrow, somewhat curved ramus densely ciliated inside, and extending along the distal joint until its posterior $\frac{1}{3}$ part, outer part of the ramus armed with 4 slender spines.

Colour not yet ascertained.

Length of the specimen examined 0.55 mm.

Remarks.—The above described form agrees in almost all its details so closely with the species recorded by Brady under the name of *Cletodes longicaudata*, that I have been in much doubt, if it not more properly should be referred to that species, in spite of its much inferior size¹). In any case the specific name *longicaudata* cannot be retained for the present form, as this name had been previously assigned by Boeck to another species of the present genus (see Vol. V, p. 286).

Occurrence.—A solitary, apparently fully grown female specimen of this form was found in a sample taken at Risør from a depth of about 30 fathoms.

Distribution.—?British Isles (Brady & Scott).

64. *Cletodes perplexus*, Scott.

(Pl. LIII).

Cletodes perplexus, Scott, Seventeenth Annual Report of the Fishery Board for Scotland, Part III, p. 257, Pl. XI, figs. 12—20; Pl. XII, fig. 1.

Specific Characters.—*Female.* Body comparatively more robust than in any of the preceding species, and tapering somewhat behind. Cephalic

¹) Brady gives the length to 0.79 mm., and Scott to no less than 0.84 mm.

segment about the length of the 3 succeeding segments combined and broadly rounded in front; rostral projection rather prominent, and terminating in an acute somewhat recurved point. Last trunkal segment comparatively large and tumid. Urosome not fully attaining the length of the anterior division; genital segment fully as long as the 2 succeeding segments combined, and distinctly subdivided in the middle; last segment exceeding in length the preceding one and conspicuously contracted distally. Caudal rami rather slender and narrow, about half the length of the remaining part of the tail; outer edge with 2 successive small bristles in its anterior half; dorsal seta issuing at the end of the first $\frac{1}{3}$ of the ramus; apical seta rather slender. Anterior antennæ comparatively short and stout, scarcely exceeding half the length of the cephalic segment; 2nd joint much the largest, being nearly twice as long as the 3rd. Posterior antennæ rather strongly built, with the terminal joint considerably dilated at the end, innermost apical seta remarkably strong and clotted on the outer edge with long cilia; outer ramus more fully developed than in the other species and provided with 3 marginal setæ. Oral parts normal. Natatory legs likewise built in the usual manner, though comparatively rather small; outer ramus in all of them without any setæ inside. Last pair of legs very peculiar and unlike those in any of the other known species; proximal joint without any bristle-bearing process outside, its inner part considerably expanded and highly chitinised carrying inside 2 successive spiniform setæ and produced at the end to a long mucroniform process denticulated in its outer part and pointing obliquely backwards and outwards; distal joint very small and imperfectly defined at the base, with 3 comparatively short setæ.

Male of about same size as female and very like it in its general appearance, though easily recognisable by the distinctly hinged anterior antennæ. Last pair of legs scarcely different from those in female.

Colour pale whitish grey.

Length of adult female 0.55 mm.

Remarks.—The highly remarkable structure of the last pair of legs is sufficient for at once distinguishing the present form from any of the other known species. In the other structural details it shows itself however to be a true member of the present genus.

Occurrence.—Two specimens only of this form, a female and a male, have as yet come under my notice. They were found last summer (1918) at Hvalør, outside the Christiania Fjord, in a depth of about 6 fathoms, muddy bottom.

Distribution.—Scottish coast (Scott).

Gen. **Mesocletodes**, G. O. Sars.

Remarks.—This genus was established by the present author to include the form described by Scott as *Cletodes irrasa*, which I found differed in certain points so materially from the other members of the present family as more properly to be separated from them generically. The validity of this genus I am now enabled to confirm by adding 3 other species which are evidently congeneric with the above-mentioned form.

65. **Mesocletodes monensis**, (Thompson).

(Pl. LIV).

Cletodes monensis, I. C. Thompson, Proc. & Transact. of Liverpool Zool. Society, Vol. VII, p. 200, Pl. XXXIV.

Specific Characters.—*Female.* Body comparatively more slender than in the type species and about of equal width throughout; all the segments minutely denticulate at the hind edge. Cephalic segment about the length of the 3 succeeding segments combined and somewhat contracted in its anterior part; rostral projection well defined and slightly curved downwards, with the tip acutely pointed; dorsal face of the segment somewhat vaulted and exhibiting behind the middle a very conspicuous horn-like process curved backwards. Urosome about the length of the anterior division; genital segment of moderate size and imperfectly subdivided in the middle; last segment nearly as large as the 2 preceding segments combined, and having the anal opercle somewhat prominent and armed dorsally with 2 successive denticles, the posterior one rather coarse and pointing backwards. Caudal rami slender and narrow, though not nearly attaining half the length of the remaining part of the tail; outer edge with 2 small bristles, the one attached at a short distance from the base, the other close to the end; dorsal seta issuing somewhat in front of the middle; apical setæ very unequal, the middle one much the largest and about as long as the ramus, the innermost extremely small. Anterior antennæ rather slender, nearly attaining the length of the cephalic segment, and composed of 7 sharply defined joints clothed with comparatively short, partly spiniform setæ; 2nd joint much the largest; antepenultimate joint about the length of the last 2 joints combined. Posterior antennæ with the outer ramus very small, bisetose. Oral parts agreeing in structure with those in the type species. Natatory legs likewise rather similar, though comparatively somewhat less slender; inner ramus very small, but, as in the type species, distinctly biarticulate. Last pair of legs confluent in the middle; distal joints narrow linear in form, not dilated

at the end, and provided with 6 marginal setæ, 3 very small on the outer edge, and 3 on the tip; inner expansion of proximal joint more distinctly defined than in the type species, and carrying 3 well-developed marginal setæ. Ovisac very small.

Colour whitish grey.

Length of adult female 0.87 mm.

Remarks.—The present form, first described by I. C. Thompson, may at once be distinguished from the type species, *M. irrasus* Scott, by the peculiar horn-like process springing off from the dorsal face of the cephalic segment. In the more general structural details it shows a near relationship to that species, though, on a closer comparison, some well-marked minor differences may be found to exist, especially as regards the mutual relations of the joints in the anterior antennæ and the shape of the last pair of legs.

Occurrence.—I have only met with this form in a single locality on the Norwegian coast, viz., at Risør, where it occurred occasionally in a depth of about 50 fathoms, coarse muddy sand. All the specimens obtained were of the female sex.

Distribution.—Liverpool Bay (Thompson).

66. *Mesocletodes abyssicola*, (Scott).

(Pl. LV).

Cletodes abyssicola, Scott, On some Entomostraca collected in the Arctic Seas by W. Bruce. Ann. Mag. Nat. Hist. ser. 7, Vol. VIII, p. 347, Pl. V, figs. 1—8.

Specific Characters.—*Female.* Body comparatively a little less slender than in the preceding species, with the segments coarsely denticulate at the hind edge. Cephalic segment somewhat tumid, with the frontal part broadly rounded off; rostral projection very small, almost obsolete; dorsal face of the segment considerably vaulted and armed behind, as in the preceding species, with a strong spiniform process still more prominent and curved than in that species. Urosome, as in the other species of the present genus, nearly of uniform width throughout, with the last segment rather large; anal opercle tipped with a strong upturned tooth. Caudal rami very narrow and quite excessively produced, occupying more than $\frac{1}{3}$ of the entire length of the body, each ramus provided in the middle with 2 small bristles, the one lateral, the other dorsal; apical setæ very short. Anterior antennæ comparatively slender, exceeding somewhat in length the cephalic segment, and, as in the preceding species, composed of 7 joints, the 2nd of which is rather broad, though

scarcely as long as the 3rd; the 4 outer joints very narrow and subequal in size, constituting together the terminal part of the antenna, as shown by the position of the æsthetask which is attached to the 3rd instead, as usual, to the 4th joint. Posterior antennæ with the outer ramus very minute and only tipped with a single seta. Oral parts scarcely different from those in the other species. Natatory legs with the inner ramus very small, uniarticulate; outer ramus in the 3 posterior pairs exceedingly slender and narrow. Last pair of legs with the proximal joint scarcely at all expanded inside, and only provided with a single small seta on the posterior edge; distal joint narrow linear in form, with a small bristle outside beyond the middle, and with 3 unequal apical setæ.

Colour pale whitish grey.

Length of adult female 0.84 mm.

Remarks.—The near relationship of the present form to the preceding one is clearly shown by the presence of a quite similar spiniform process on the dorsal face of the cephalic segment. It is however at once distinguished from that species by the excessively prolonged and narrow caudal rami, as also by the very small rostral projection. Some aberrant characters, as to the structure of the anterior antennæ and legs, have moreover been indicated in the above diagnosis.

Occurrence.—2 or 3 female specimens only of this form have as yet come under my notice. They were found at Risør at the considerable depth of about 100 fathoms, muddy bottom.

Distribution.—Arctic Sea (Scott).

67. *Mesocletodes inermis*, G. O. Sars, n. sp.

(Pl. LVI).

Specific Characters.—*Female.* Body resembling somewhat in shape that of *M. monensis*, though on the whole rather more robust. Cephalic segment, as in that species, slightly contracted in front, with the rostral projection well defined and rather prominent, tridentate; dorsal face of the segment not much vaulted and without any trace of a spiniform process. Urosome about the length of the anterior division, with the last segment rather large; anal opercle not much prominent and edged with about 5 small denticles. Caudal rami only slightly longer than the anal segment, but of the usual narrow linear shape, with 2 small bristles, rather remote from each other, on the outer edge; dorsal seta issuing somewhat beyond the middle; apical setæ comparatively

short. Anterior antennæ rather slender, nearly attaining the length of the cephalic segment, and composed of 8 well defined joints, the 2nd of which is, as usual, the largest, though scarcely as long as the 2 succeeding joints combined, the 4 outer joints, composing the terminal part of the antenna, of about equal size. Posterior antennæ comparatively small, with the outer ramus poorly developed, bisetose. Oral parts of the structure characteristic of the genus. Natatory legs comparatively less slender than in the other species, and coarsely aculeate outside, inner ramus reduced to a minute nodiform prominence carrying in the 1st pair only one, in the other pairs 2 small bristles. Last pair of legs with the distal joint of the usual narrow linear form, and provided with 5 marginal setæ, 3 apical and 2 lateral, the latter attached to the outer edge beyond the middle; inner expansion of proximal joint produced to a well defined narrow linguiform lamella carrying on the end 2 rather slender and distinctly ciliated setæ accompanied outside by a very small spinule.

Colour brownish grey.

Length of adult female 0.86 mm.

Remarks.—This new species is nearly allied to *M. monensis*, the general form of the body being rather similar, though somewhat more robust. It is however at once distinguished from that species by the absolute absence of any dorsal process on the cephalic segment. The specific name here proposed alludes to this want. As to the structural details, it moreover differs in the distinctly 8-articulate anterior antennæ and in the rudimentary condition of the inner ramus of the natatory legs.

Occurrence.—Several specimens of this form, all of the female sex, were found at Risør in depths ranging from 30 to 60 fathoms, coarse muddy sand.

Gen. *Eurycletodes*, G. O. Sars.

Remarks.—Of this genus 4 species have been described in Vol. V of the present work. To these are now added 4 others, increasing the number of Norwegian species of this genus to 8 in all.

68. *Eurycletodes serratus*, G. O. Sars, n. sp.

(Pl. LVII).

Specific Characters.—*Female.* Body comparatively short and stout, of nearly equal width throughout, with all the segments coarsely denticulate at the hind edge. Cephalic segment scarcely as long as the 2 succeeding seg-

ments combined, and produced in front to a rather prominent acutely pointed rostral projection. Urosome about the length of the anterior division, with the 3 anterior segments produced on each side to well-marked spiniform prominences, giving that part a pronouncedly serrate appearance; last segment very large and, viewed from above, regularly quadrangular in outline; anal opercle edged with scattered strong denticles (about 5 in number). Caudal rami resembling in shape those in *E. laticaudatus*, being rather narrow and somewhat tapered distally; dorsal seta issuing from a knoblike prominence at a short distance from the end of the ramus. Anterior antennæ not fully attaining the length of the cephalic segment and, as in the other known species, composed of 6 joints, 3 of which belong to the terminal part, 1st joint the largest, 2nd joint a little shorter than the 3rd; terminal part about the length of the 2 preceding joints combined, with the last joint rather produced. Posterior antennæ without any trace of an outer ramus. Mandibular palp distinctly biarticulate. Posterior maxillipeds moderately strong. Natatory legs with both rami well developed; the inner one biarticulate and in 1st pair nearly as long as the outer, in the succeeding pairs rather shorter. Last pair of legs with the distal joint oblong oval in form and only slightly tapered distally, marginal setæ 5 in number; inner expansion of proximal joint not much produced and carrying 3 subequal setæ.

Colour dark grey.

Length of adult female 0.87 mm.

Remarks.—The present form is nearly allied to the type species, *E. laticaudatus* (Boeck), agreeing with it rather closely in most of the structural details. It is however of considerably larger size, and moreover at once distinguished by the conspicuously serrated edges of the urosome, in which latter respect it more resembles *E. latus* (Scott).

Occurrence.—Some few female specimens of this fine species were taken at Risør from a depth of 60—80 fathoms, muddy bottom.

69. *Eurycletodes oblongus*, G. O. Sars, n. sp.
(Pl. LVIII).

Specific Characters.—*Female.* Body comparatively more slender than in the preceding species, oblong in form, with the segments less coarsely denticulated at the hind edges. Cephalic segment fully as long as the 3 succeeding segments combined, and produced in front to a broadly triangular rostral projection. Urosome scarcely attaining the length of the anterior

division and somewhat less broad, with the anterior segments produced laterally to well defined, posteriorly-pointing acute projections; last segment very large, with the lateral edges somewhat arched and minutely denticulate; anal opercle edged with about 10 strong denticles. Caudal rami comparatively small, being only slightly longer than they are broad; dorsal seta issuing from a rather prominent tubercle somewhat in front of the middle; apical setæ unusually short. Anterior antennæ not nearly attaining the length of the cephalic segment; 2nd joint shorter, but much broader than the 3rd; terminal part about the length of those joints combined. Posterior antennæ rather small, with the outer ramus replaced by a simple seta. Posterior maxillipeds comparatively strong. Natatory legs with the inner ramus poorly developed, only consisting of a single joint, carrying in the 2 anterior pairs 4, in the 2 posterior pairs only 2 setæ. Last pair of legs with the distal joint narrow oblong in form and only provided with 4 setæ, 2 apical and 2 lateral; inner expansion of proximal joint conically produced, and extending about to the middle of the distal joint, tip provided with 2 subequal setæ.

Colour whitish grey.

Length of adult female 0.78 mm.

Remarks.—In the structural details this form seems to approach nearest to *E. major* G. O. Sars. It is however rather inferior in size and moreover at once distinguished by the well-marked lateral armature of the anterior segments of the urosome, as also by the less produced caudal rami.

Occurrence.—Two female specimens only of this form have as yet come under my notice. They were taken at Risør from a depth of about 30 fathoms.

70. *Eurycletodes aculeatus*, G. O. Sars, n. sp.

(Pl. LIX).

Specific Characters.—*Female.* General form of the body somewhat resembling that in *E. oblongus*, though perhaps a little shorter and stouter. Cephalic segment scarcely longer than the 2 succeeding segments combined; rostral projection only slightly prominent and obtusely pointed at the end. Urosome about the length of the anterior division, and having the hind edges of the segments very coarsely dentate, the outermost tooth on the 2 anterior segments being much stronger than the others and projecting on each side. Last caudal segment large, with the lateral edges slightly convex and finely hairy; anal opercle broadly rounded off and edged with about 12 denticles of

moderate size. Caudal rami comparatively small, though somewhat longer than they are broad; dorsal seta issuing about in the middle from a well-marked knob-like prominence; apical setæ of moderate length. Anterior antennæ nearly attaining the length of the cephalic segment; 2nd joint rather short, scarcely more than half as long as the 3rd; 4th joint unusually produced anteriorly. Posterior antennæ, as in the preceding species, with the outer ramus replaced by a simple seta. Posterior maxillipeds moderately strong. Natatory legs with the inner ramus uniarticulate, largest on the 1st pair and successively diminishing in size on the succeeding pairs. Last pair of legs with the distal joint very narrow and somewhat tapered towards the end, carrying 4 setæ, the proximal one rather remote from the other 3, which issue from the outermost part of the joint; inner expansion of proximal joint only slightly produced and provided with 2 subequal setæ.

Colour whitish grey.

Length of adult female 0.73 mm.

Remarks.—The present form may be easily recognised by the unusually coarse dentation of the caudal segments, a character which has given rise to the specific name here proposed. In the structure of the several appendages it seems to come nearest to *E. oblongus*.

Occurrence.—Some female specimens of this form were obtained at Risør in a depth of about 50 fathoms, muddy bottom. It also occurs occasionally at Korshavn in about the same depth.

71. *Eurycletodes minutus*, G. O. Sars, n. sp.

(Pl. LX).

Specific Characters.—*Female.* Body short and stout, with the anterior division conspicuously broader than the posterior and somewhat depressed. Cephalic segment comparatively large, considerably exceeding in length the 2 succeeding segments combined, and gradually somewhat contracted in front; rostral projection only slightly prominent and obtusely pointed at the end. Urosome much shorter than the anterior division and narrower than usual, with the segments uniformly denticulated at the hind edges and the lateral corners not produced; last segment, as usual, of rather large size, with the lateral edges slightly convex and finely hairy; anal opercle quite smooth at the edge. Caudal rami about twice as long as they are broad and only slightly tapered distally; dorsal seta issuing about in the middle; apical setæ of moderate length. Antennæ and oral parts resembling in structure those in

the 2 preceding species. Natatory legs with the inner ramus still more reduced in size and apparently quite wanting on the 4th pair; outer ramus in this and the 2 preceding pairs very slender and narrow. Last pair of legs with the distal joint narrow linear in form and imperfectly defined at the base, marginal setæ rather small and 4 in number; inner expansion of proximal joint very slightly produced and carrying 2 unequal setæ.

Colour whitish grey.

Length of adult female 0.53 mm.

Remarks.—This small species may be easily recognised by the somewhat unusual shape of the body, the anterior division being, unlike what is generally the case, conspicuously broader than the posterior. In the structural details it shows itself however to be a true member of the present genus.

Occurrence.—Some few specimens of this form, all of the female sex, were found at Risør in depths ranging from 30 to 50 fathoms, muddy bottom.

Gen. *Leptocletodes*, G. O. Sars, n.

Generic Characters.—Body of slender form, with very thin and fragile integuments. Rostral projection inconspicuous. Urosome narrower than the anterior division, with the segments scarcely denticulate behind; last segment comparatively large. Caudal rami narrow and rather far apart. Anterior antennæ 7-articulate, with the terminal joint elongate. Posterior antennæ small with the outer ramus imperfectly developed. Mandibular palp distinctly biarticulate. Maxillæ with a small exopodal lobe tipped with a single bristle. Maxillipeds normal. Natatory legs slender, with both rami well developed, the inner one shorter than the outer and biarticulate. Last pair of legs with the proximal joint scarcely expanded inside; distal joint long and slender.

Male unknown.

Remarks.—This new genus is only founded on a single species, which however cannot properly be referred to any of the hitherto known genera of the present family, though in some respects apparently approaching somewhat the genus *Eurycletodes*. The generic name here proposed alludes both to the comparatively slender form of the body and to the very thin and fragile integuments.

72. *Leptocletodes debilis*, G. O. Sars, n. sp.

(Pl. LXI).

Specific Characters.—Female. Body rather slender and narrow, with the anterior division only slightly dilated, though somewhat broader than the posterior. Cephalic segment exceeding in length the 2 succeeding segments combined, and somewhat vaulted dorsally; frontal margin slightly produced in the middle, though not forming any true rostrum. Last trunkal segment comparatively small. Urosome not attaining the length of the anterior division, and rather narrow, cylindrical in form; genital segment fully as long as the 2 succeeding segments combined and imperfectly subdivided in the middle; last segment oblong quadrangular in outline, with the anal opercle broadly truncated at the end and perfectly smooth. Caudal rami widely apart, and narrow linear in form, not however attaining the length of the anal segment, both the outer and inner edge carrying beyond the middle a small seta; dorsal seta issuing near the end of the ramus; apical setæ rather slender. Anterior antennæ fully as long as the cephalic segment and composed of 7 well defined joints clothed with scattered comparatively short setæ; the first 2 joints about equal in size, each of them equalling in length the 2 succeeding joints combined; terminal part of the antenna, composed of the 3 outer joints, almost as long as the proximal one, with the last joint rather large, fully as long as the other 2 combined. Posterior antennæ rather feeble, with the outer ramus very small, uniarticulate, and tipped by a single seta. 1st pair of natatory legs, as usual smaller than the others, with the rami less unequal in length, the outer one being only slightly longer than the inner and without any setæ inside. The 3 succeeding pairs of legs with the outer ramus very slender and narrow, inner one successively somewhat diminishing in length, extending in 2nd pair beyond the middle joint of the outer, in 4th pair only as far as the 1st joint of that ramus. Last pair of legs with the proximal joint produced outside to a long digitiform process tipped with a slender bristle, inner part of the joint not at all expanded, and only provided behind with a single seta arising from a knoblike prominence of the margin; distal joint greatly produced and narrow linear in form, though a little dilated in its outer part, and carrying 4 comparatively small marginal setæ, 2 lateral and 2 apical.

Colour whitish pellucid.

Length of adult female 0.63 mm.

Remarks.—In its outward appearance this form somewhat reminds on *Fultonina hirsuta* Scott (see Vol. V, p. 341), which however otherwise is rather

different, and has been referred provisionally by the present author to another family, viz., the *Tachidiidæ*. The great fragility of the animal renders its exact examination rather difficult, and has indeed given rise to the specific name here proposed.

Occurrence.—Some specimens of this form, all of the female sex, were found at Risør in depths ranging from 50 to 100 fathoms, muddy bottom.

Gen. *Pseudocletodes*, G. O. Sars, n.

Generic Characters.—Body slender and attenuated, with strongly chitinated integuments, and all the segments distinctly denticulate at the hind edge. Cephalic segment peculiarly expanded below, and produced in front to a well defined rostral projection. Urosome with the segments somewhat expanded laterally; last segment smaller than the preceding ones. Caudal rami somewhat produced and rather narrow. Anterior antennæ of moderate size, but with the number of joints much reduced. Posterior antennæ with the outer ramus well defined, uniarticulate. Mandibular palp likewise uniarticulate. Maxillæ without any distinctly defined exopodal lobe. Anterior maxillipeds with 3 setiferous lobes inside the basal part. Posterior maxillipeds moderately strong. 1st pair of legs small, with both rami biarticulate; the 3 succeeding pairs with the outer ramus distinctly triarticulate and very slender, inner ramus biarticulate and shorter than the outer. Last pair of legs of rather a peculiar shape, the proximal joint being remarkably produced both outside and inside, distal joint comparatively small.

Male unknown.

Remarks.—This genus also is only founded on a single species, which however exhibits several very conspicuous peculiarities both as to the outward appearance and the structural details, preventing its reference to any of the hitherto known genera of the present family.

73. *Pseudocletodes typicus*, G. O. Sars, n. sp.

(Pl. LXII).

Specific Characters.—*Female*. Body of rather slender form and gradually attenuated behind, with the segments rather sharply marked off from each other. Cephalic segment of very large size, occupying rather more than half the length of the anterior division, and forming below on each side a broad

lamellar expansion covering at the sides the oral area; rostral projection considerably prominent, with the end narrowly produced and terminating in 2 small juxtaposed points. Urosome somewhat shorter than the anterior division, with the lateral parts of the segments slightly prominent and rounded off; genital segment comparatively large and distinctly subdivided in the middle; last segment shorter than the preceding one, with the anal opercle coarsely denticulate at the edge; all the caudal segments containing within their lateral parts a very conspicuous rounded opaque body of apparently glandular nature. Caudal rami slightly exceeding in length the anal segment and rather narrow, with 2 juxtaposed bristles on the outer edge at a short distance from the end; dorsal seta issuing a little farther behind; apical setæ very slender. Anterior antennæ nearly as long as the cephalic segment, and only composed of 4 distinctly defined joints clothed with scattered comparatively short and stout setæ; 2nd joint produced behind in the middle to a strong claw-like projection; 3rd joint about the length of the first 2 joints combined, and exhibiting at the end, in addition to the projection carrying the usual æsthetask, a small conical process tipped with a seta, and apparently representing the remnant of a small joint originally intercalated between it and the succeeding (last) joint, but otherwise wholly coalesced with the former; terminal joint about as long as the 3rd, but much narrower. Posterior antennæ of moderate size; outer ramus formed by a small, but well defined joint carrying on the tip 2 somewhat unequal setæ. 1st pair of legs much smaller than the succeeding ones and, as usual, armed at the inner corner of the 2nd basal joint with a deflexed spine; inner ramus somewhat shorter and much narrower than the outer, with the distal joint comparatively small, and carrying on the tip a slender seta accompanied by a short bristle; outer ramus without any setæ inside, its distal joint of about same size as the proximal one, and armed at the end with 3 slender spines followed by a somewhat longer ciliated seta. The 3 succeeding pairs of legs with the outer ramus very slender and narrow and without any seta inside the 1st joint; inner ramus in 2nd pair extending about to the end of the middle joint of the outer, in the 3rd and 4th pairs successively shorter. Last pair of legs with the distal joint very small, oval in form, and edged with 4 setæ; proximal joint produced outside to a long digitiform process tipped with a slender bristle; inner expansion exerted to a long conical lappet extending far beyond the distal joint, and tipped with a slender seta accompanied outside by a very minute bristle.

Colour pale yellowish grey.

Length of adult female 0.62 mm.

Remarks.—In the slender and attenuated shape of the body this form bears a general resemblance to some species of the genus *Cletodes*. It is however at once recognised from them by the peculiar shape of the cephalic segment, as also by the rather different structure of the anterior antennæ and of the 1st and last pairs of legs.

Occurrence.—Some few female specimens of this peculiar form were found at Risør in depths ranging from 30 to 60 fathoms, coarse muddy sand.

Gen. *Nannopus*, Brady.

Remarks.—Two species only of this genus are as yet known, the one (the type), *N. palustris* Brady, occurring in brackish water on the coasts of northern Europe and described in Vol. V, p. 307, the other having been recorded by the present author from the great fresh-water lake Tanganyika in Central Africa, under the name of *Ilyophilus perplexus*. I am now enabled to add a 3rd very distinct species, which, unlike the other two, is a true marine and deep-water form.

74. *Nannopus abyssi*, G. O. Sars, n. sp.

(Pl. XLIII).

Specific Characters.—*Female.* Body short and stout, gradually tapered behind, with the segments not very sharply marked off from each other and perfectly smooth. Eye absent. Cephalic segment about equalling in length the 3 succeeding segments combined, and evenly vaulted above; rostral projection abruptly deflexed, with the tip obtusely pointed and only provided on each side with a single sensory hair. Urosome scarcely longer than the exposed part of the trunk; genital segment comparatively large and imperfectly subdivided in the middle; last segment much shorter than the preceding one, with the anal opercle very small. Caudal rami about twice as long as they are broad at the base, and somewhat tapering distally, each ramus armed, inside the 2 juxtaposed bristles of the outer edge, with a short transverse row of small spinules; dorsal seta issuing near the base of the ramus; apical setæ comparatively short, the middle one of quite normal appearance. Anterior antennæ short and stout, scarcely exceeding half the length of the cephalic segment and, as in the other 2 species, composed of 5 joints clothed with rather strong, for the most part ciliated setæ; the first 3 joints successively diminishing in size, the 3rd being rather produced at the end anteriorly, the

outer 2 joints, composing the terminal part of the antenna, abruptly much smaller and subequal in size, the last one carrying behind an unusually thick and coarsely ciliated seta. Posterior antennæ very strongly built, with the terminal joint coarsely aculeate outside; outer ramus comparatively large, lamellar, with 6 strong marginal setæ. Mandibular palp likewise very fully developed and distinctly biramous, with the basal part considerably expanded and provided at the prominent inner corner with 4 strong curved setæ; both rami uniarticulate and of unequal size, the inner one being much the larger. Maxillæ with both the exopodal and epipodal lobes well defined. Maxillipeds resembling in structure those in the other 2 species. 1st pair of legs well developed and coarsely aculeate outside; inner ramus biarticulate and a little shorter than the outer. The 3 succeeding pairs of legs without the slightest trace of an inner ramus; outer ramus normally developed and only slightly longer than that of the 1st pair. Last pair of legs extremely small, though distinctly biarticulate, both joints simple, not expanded. Ovisac globular, with only a small number of comparatively large ova.

Colour whitish grey.

Length of adult female 0.68 mm.

Remarks.—This is a very distinct form, differing in some points rather markedly from the 2 previously known species, though evidently referable to the same genus. The most prominent differences relate to the great reduction of the last pair of legs and the absolute absence of an inner ramus on the 3 posterior pairs of natatory legs. On the other hand are the antennæ and the oral parts rather more fully developed than in those species, though built on the very same type

Occurrence.—A solitary specimen only of this interesting form, an ovigerous female, has as yet come under my notice. It was found at Risør in the considerable depth of nearabout 100 fathoms, muddy bottom.

Fam. Tachidiidæ.

Gen. *Danielssenia*, Boeck.

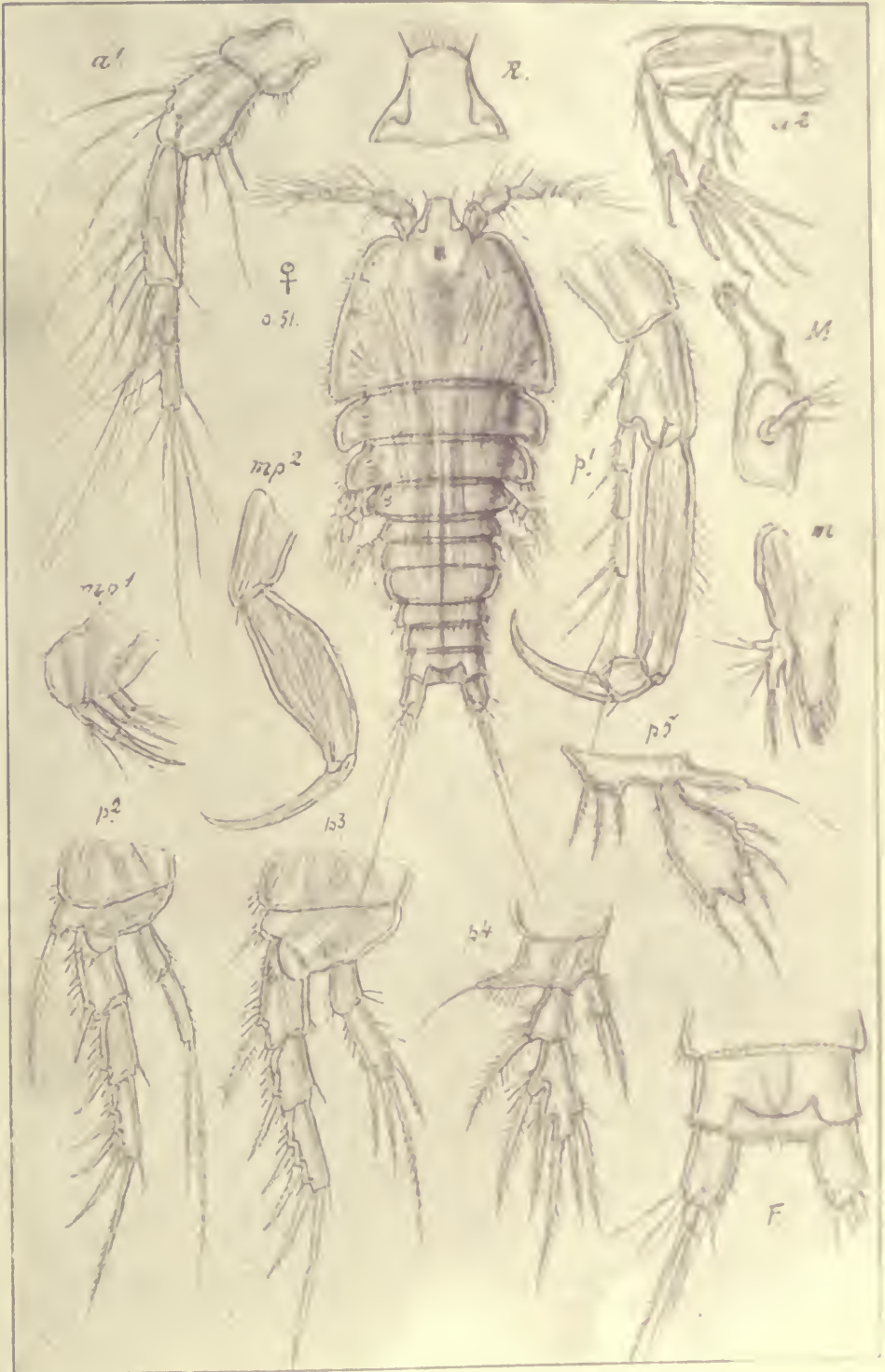
Remarks.—This genus, which is identical with *Jonesiella* of Brady, comprises as yet 4 species, 2 of which are described in Vol. V of the present work, the other 2 being recorded from the Arctic Seas. I am now enabled to add a 5th well defined and rather large species, to be described below.

Copepoda

Laophontidae

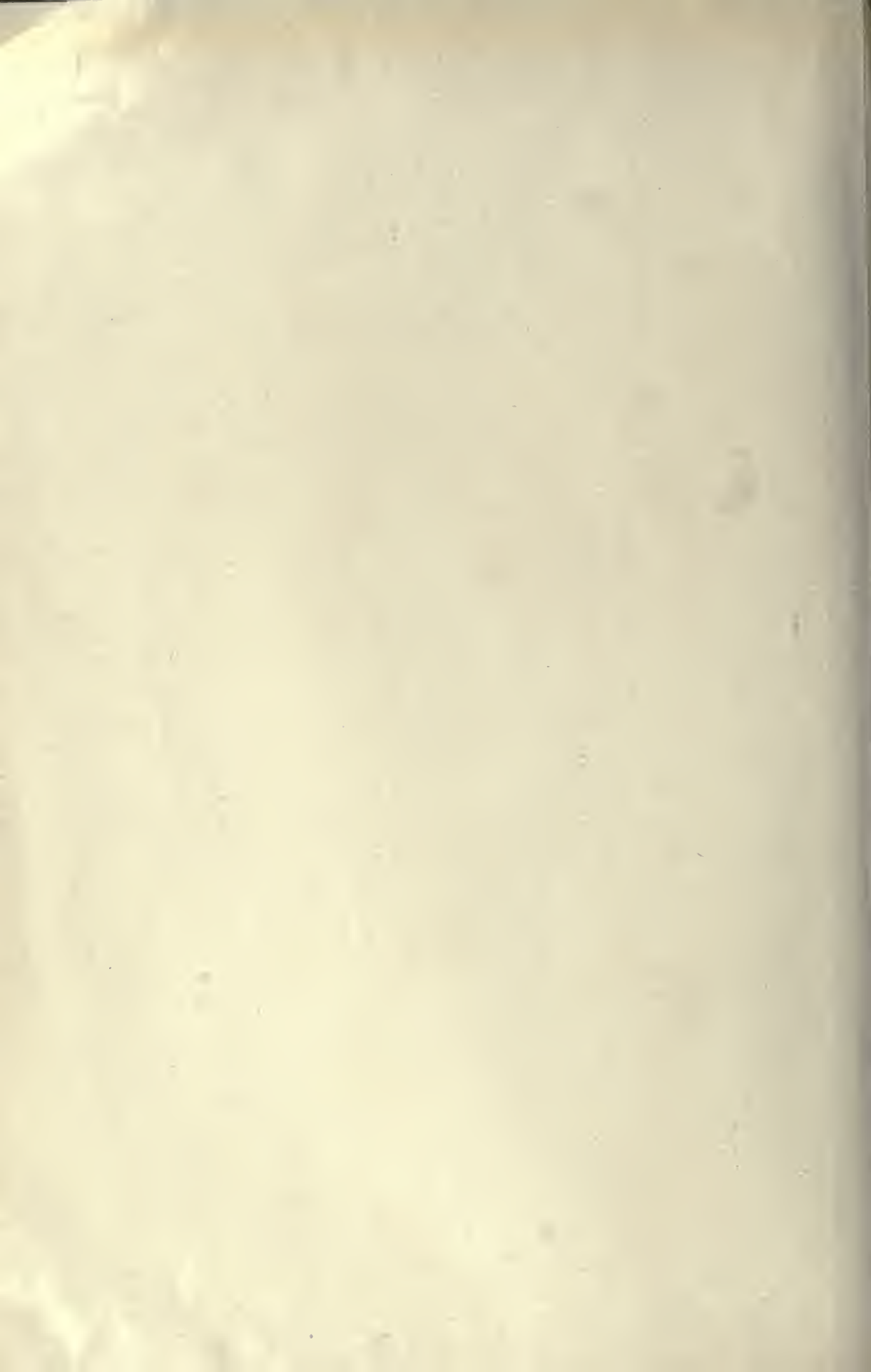
Suppl. Volume

PL. XLIX



G. O. Sars, del.

Harietella simulans. Scott

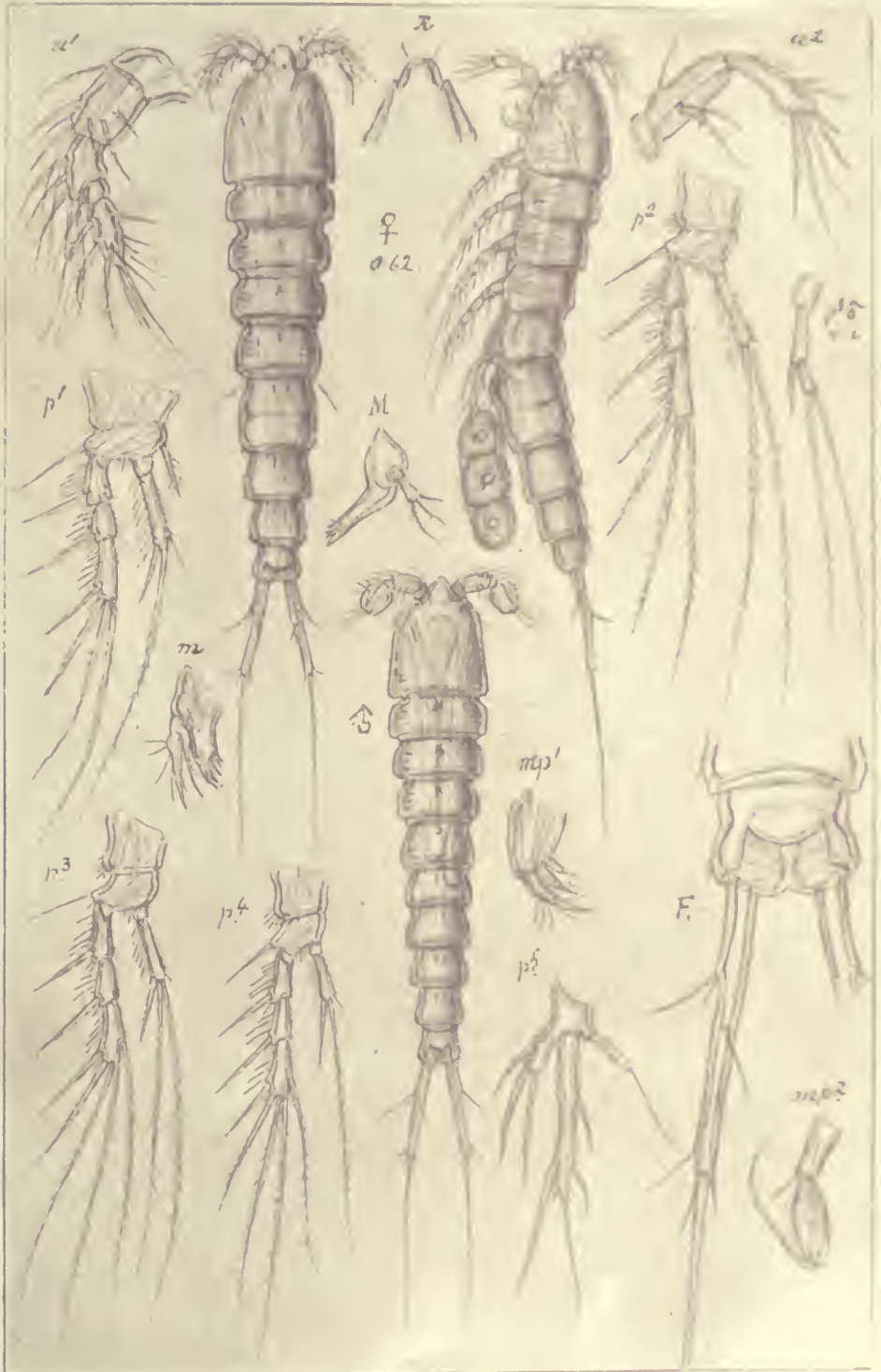


Copepoda

Cletodidæ

Suppl. Volume

Pl. L



G. O. Sars, del.

Cletodes Sarsi, Scott

Copepoda

Suppl. Volume

Cletodidae

Pl. LI



G. O. Sars, del.

Cletodes pusillus, G. O. Sars

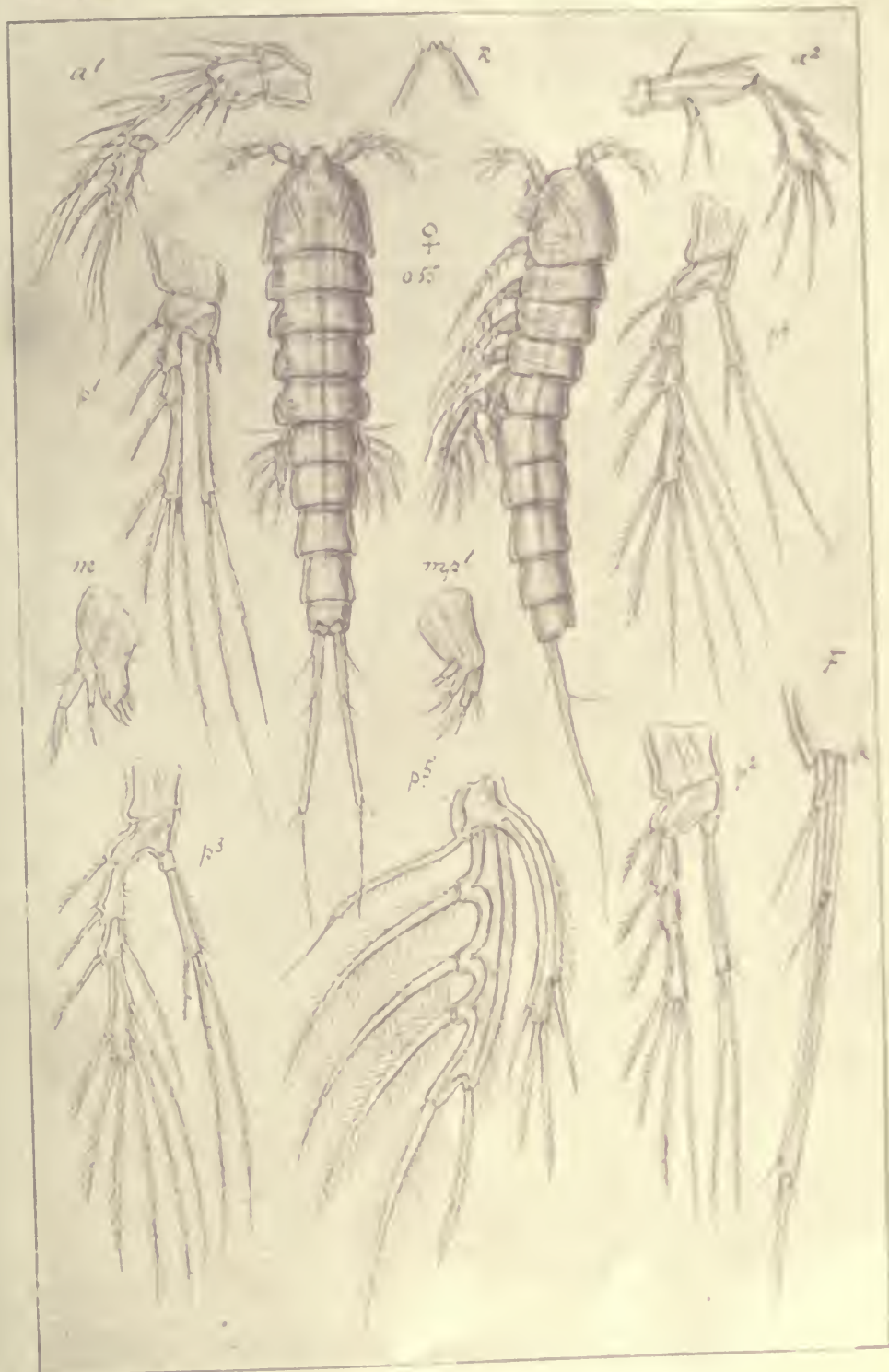


Copepoda

Suppl. Volume

Cletodidae

Pl. LII



G. O. Sars, del.

Cletodes leptostylis, G. O. Sars

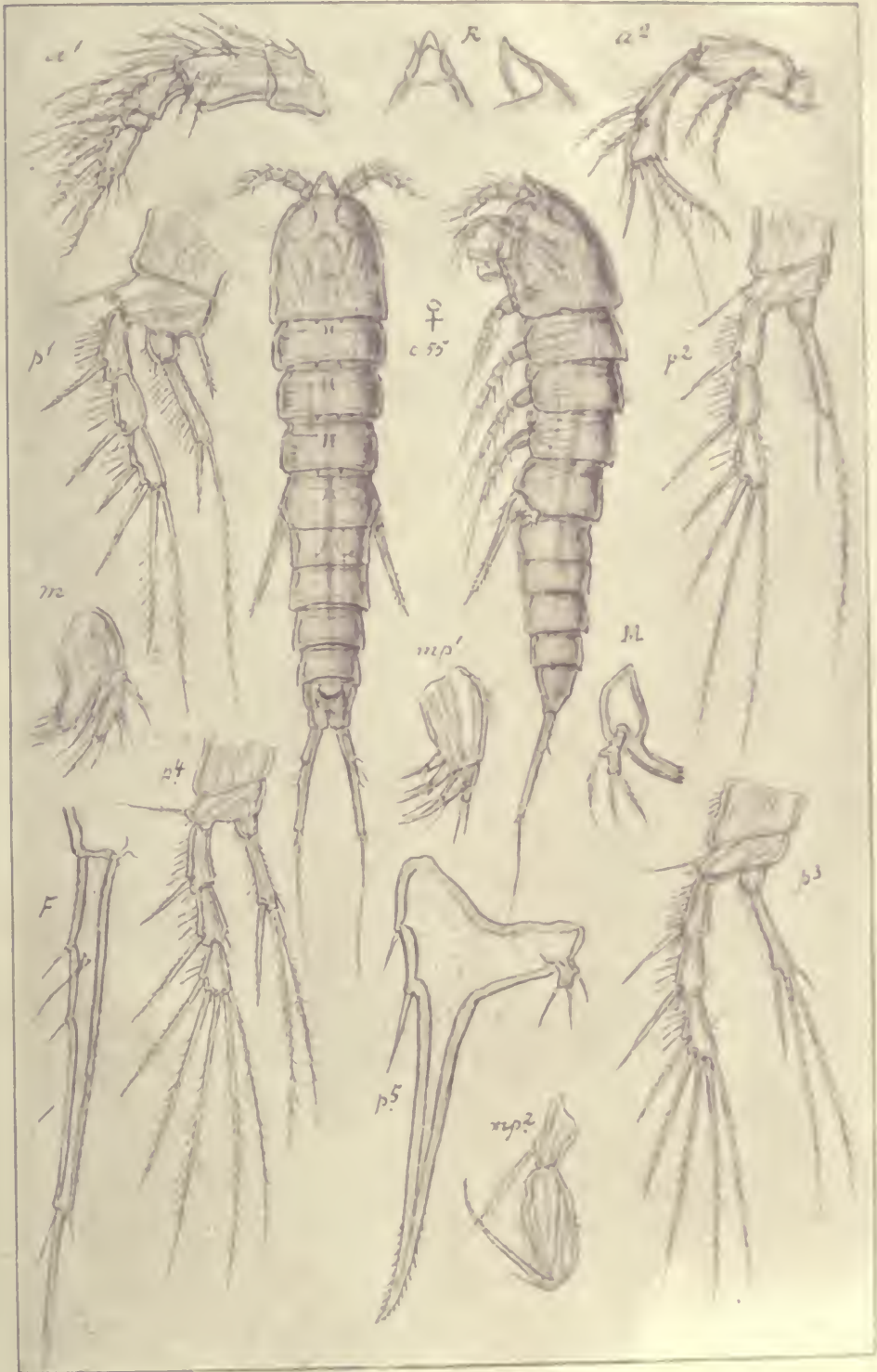


Copepoda

Suppl. Volume

Cletodidae

Pl. LIII



G. O. Sars, del.

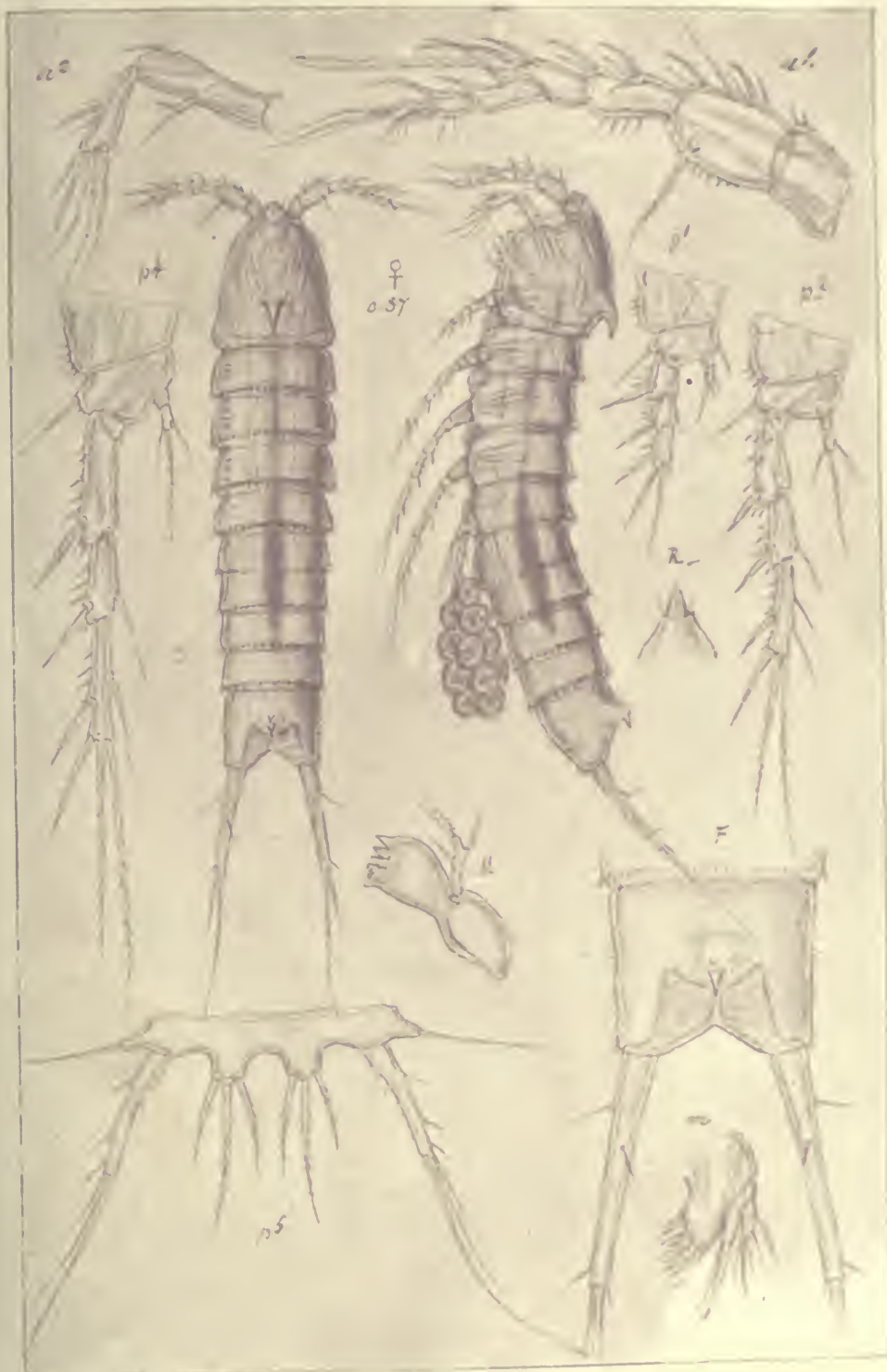
Cletodes perplexus, Scott

Copepoda

Suppl. Volume

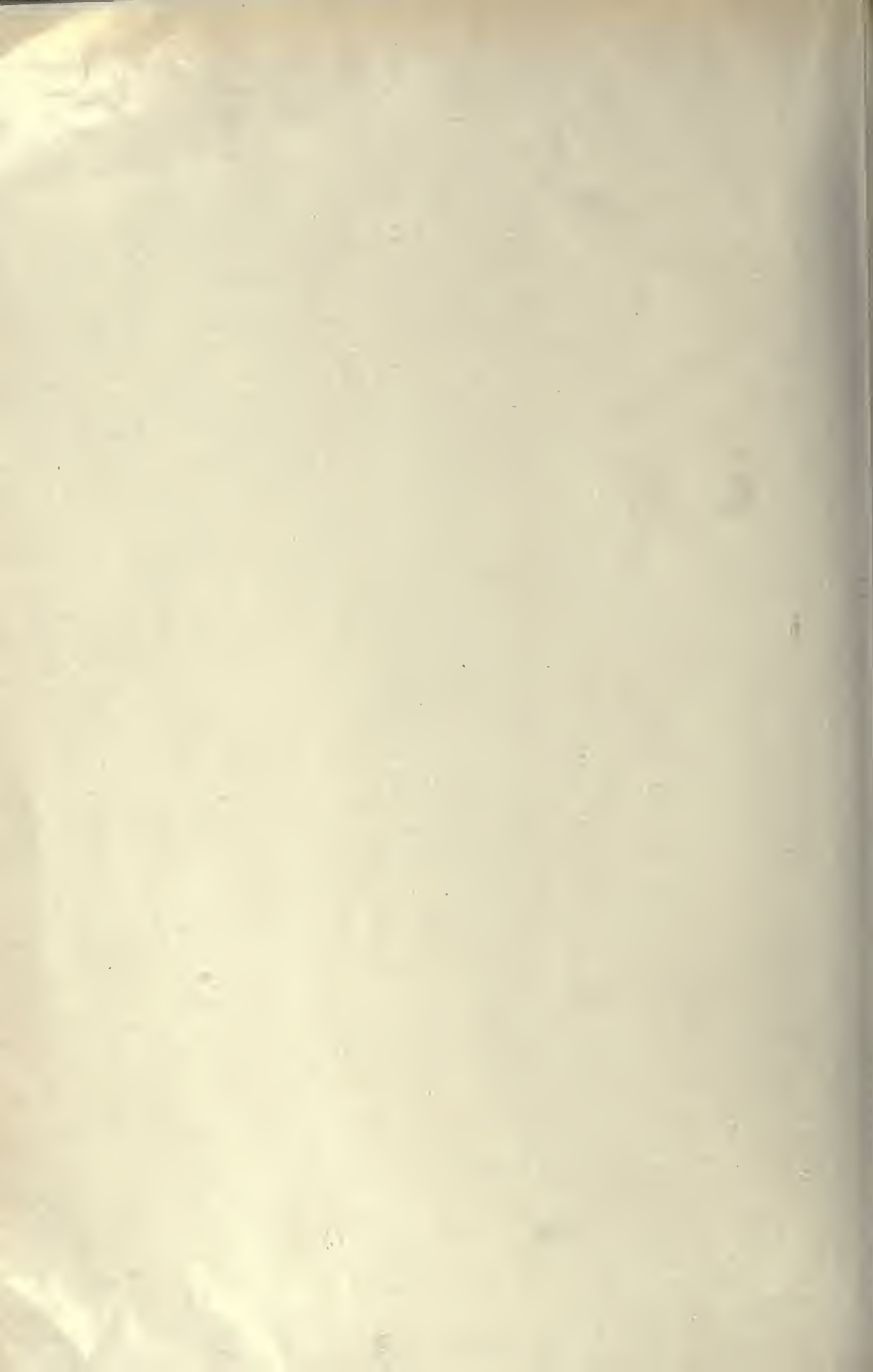
Cletodidae

Pl. LIV



G. O. Sars, del.

Mesocletodes monensis. (Thomps.)

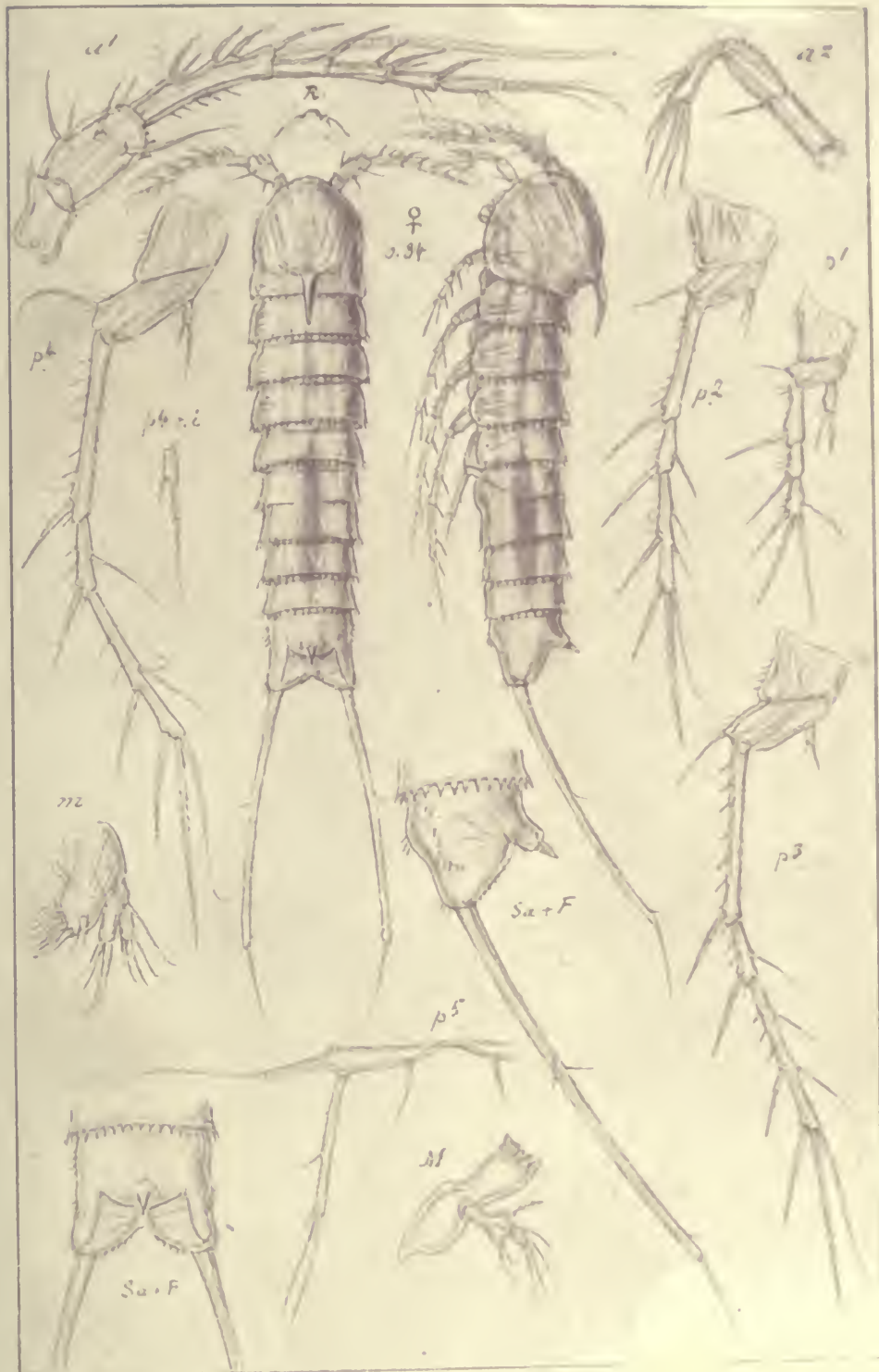


Copepoda

Suppl. Volume

Cletodidae

Pl. LV



G. O. Sars, del.

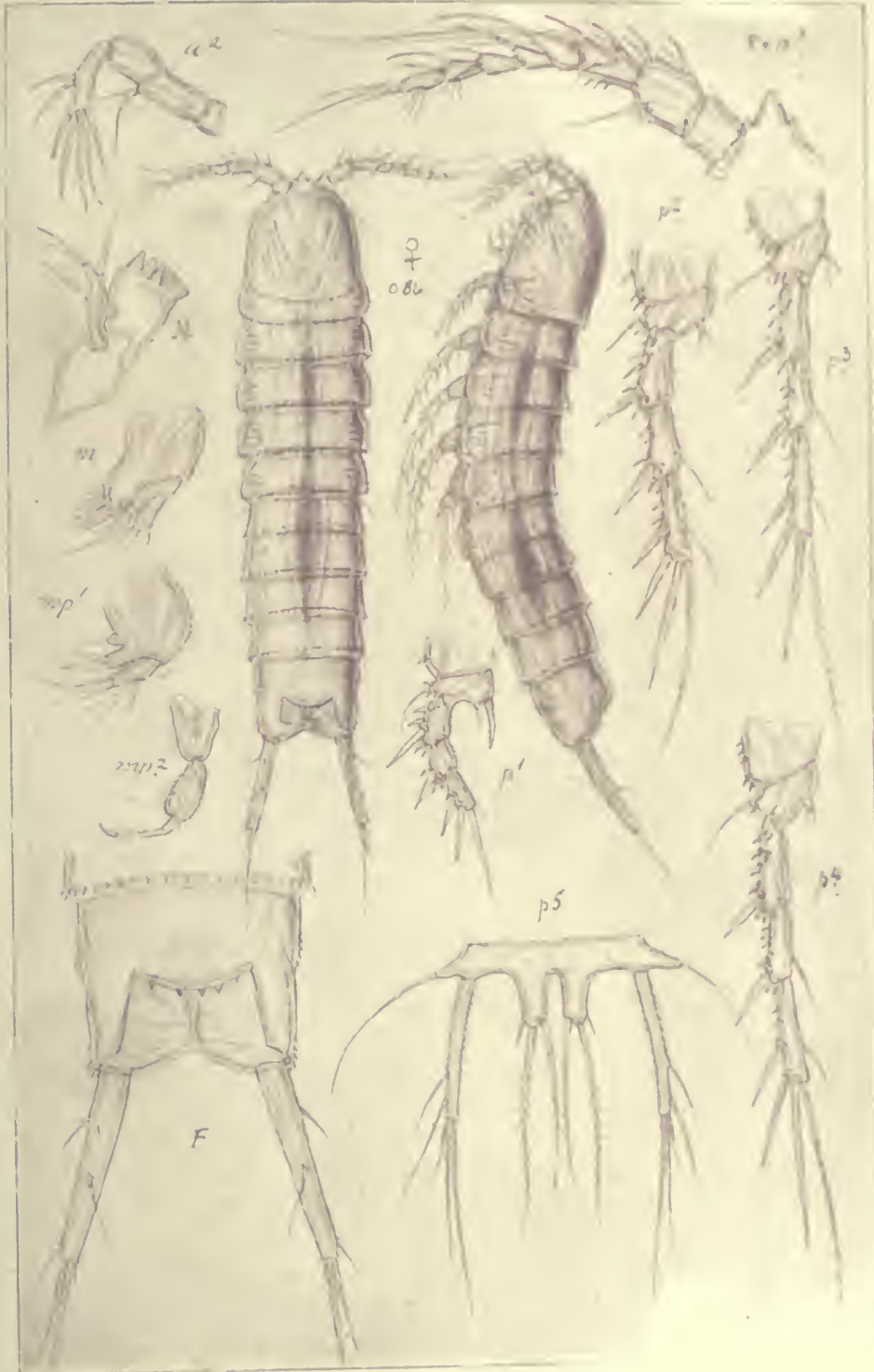
Mesocletodes abyssicola. (Scoti)

Copepoda

Suppl. Volume

Cletodidae

Pl. LVI



G. O. Sars, del.

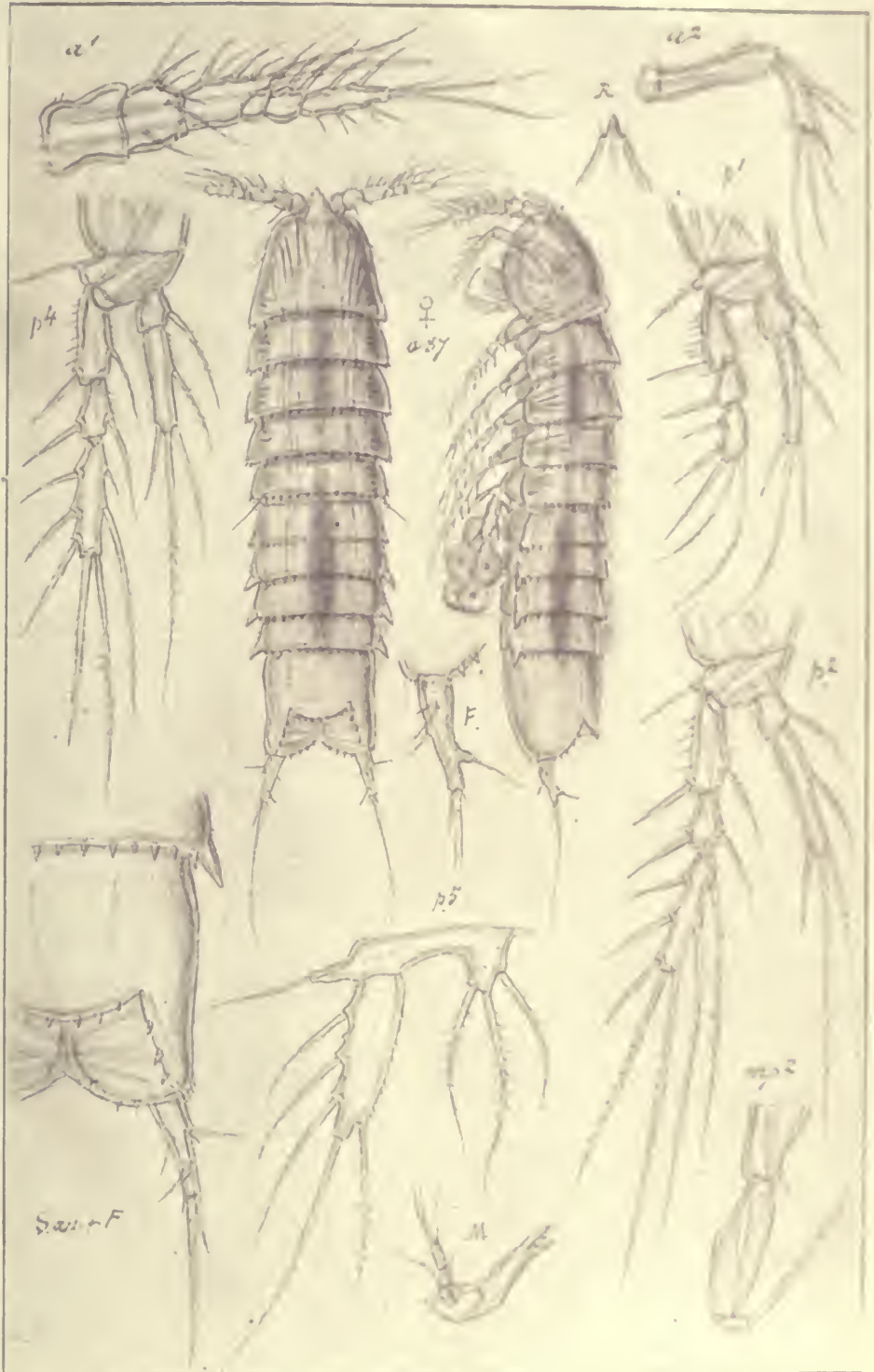
Mesocletodes inermis, G. O. Sars

Copepoda

Cletodidae

Suppl. Volume

Pl. LVII



G. O. Sars, del.

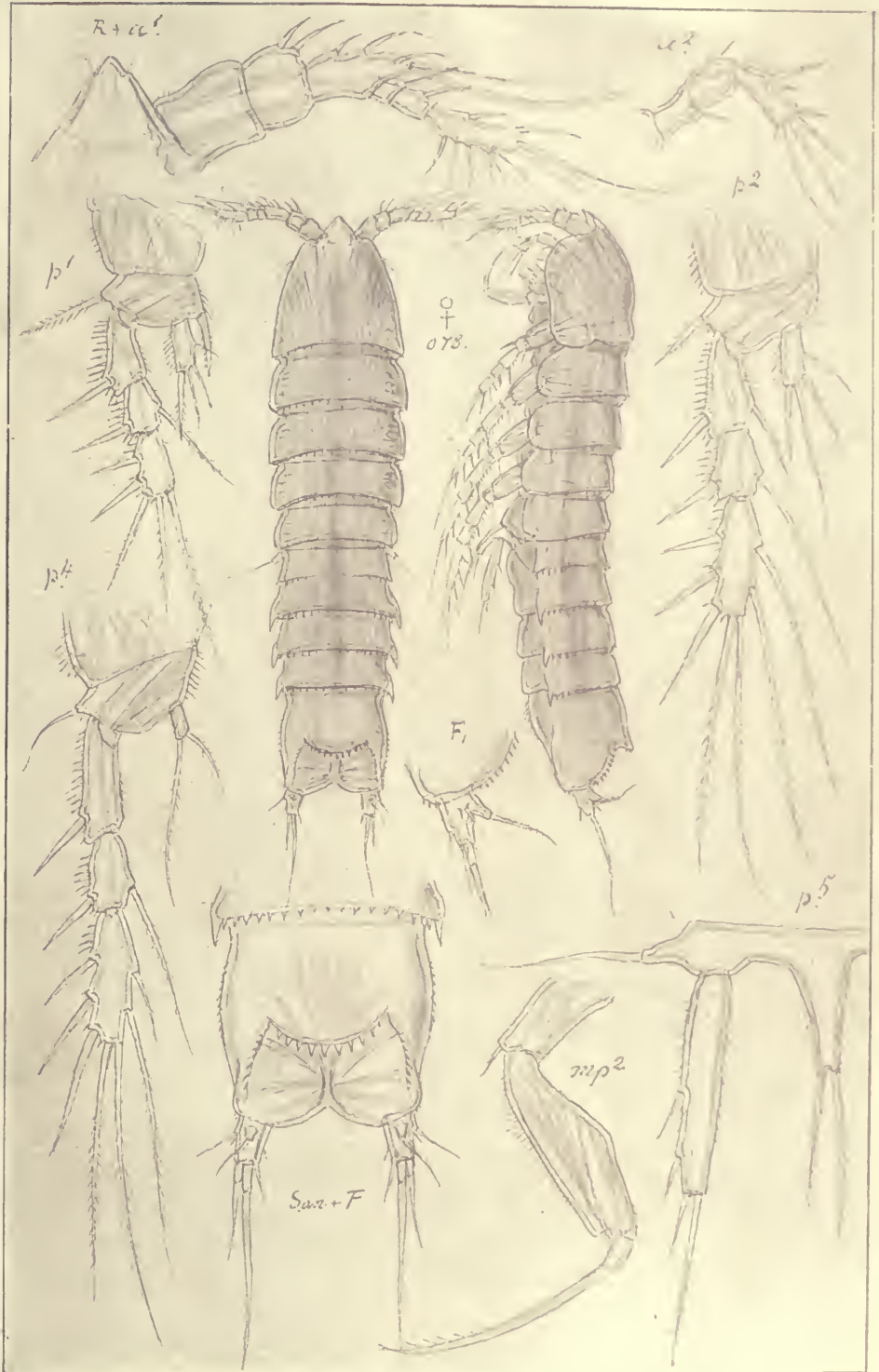
Eurycletodes serratus, G. O. Sars

Copepoda

Cletodidæ

Suppl. Volume

Pl. LVIII



G. O. Sars, del.

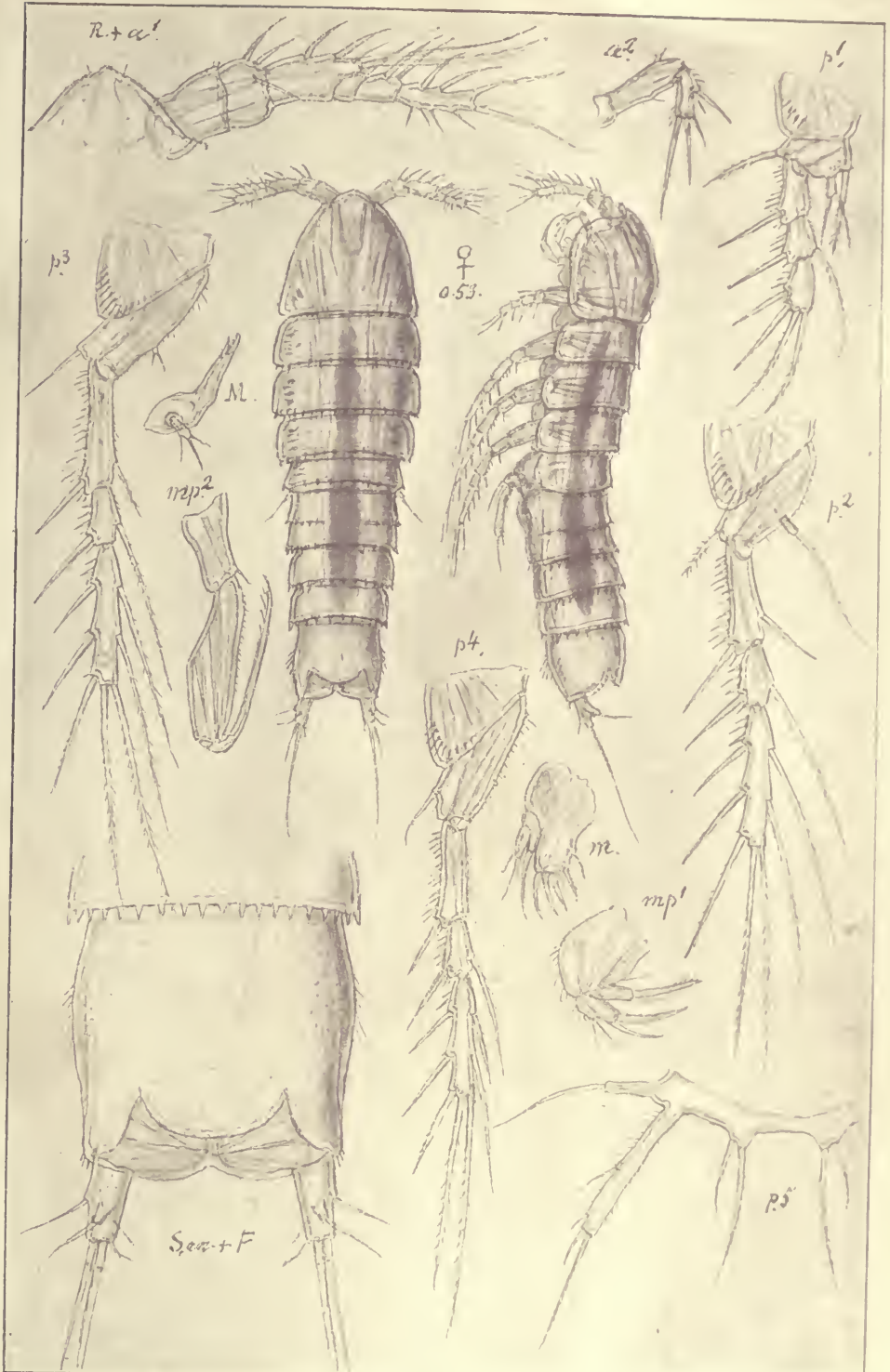
Eurycletodes oblongus, G. O. Sars

Copepoda

Cletodidæ

Suppl. Volume

Pl. LX



G. O. Sars, del.

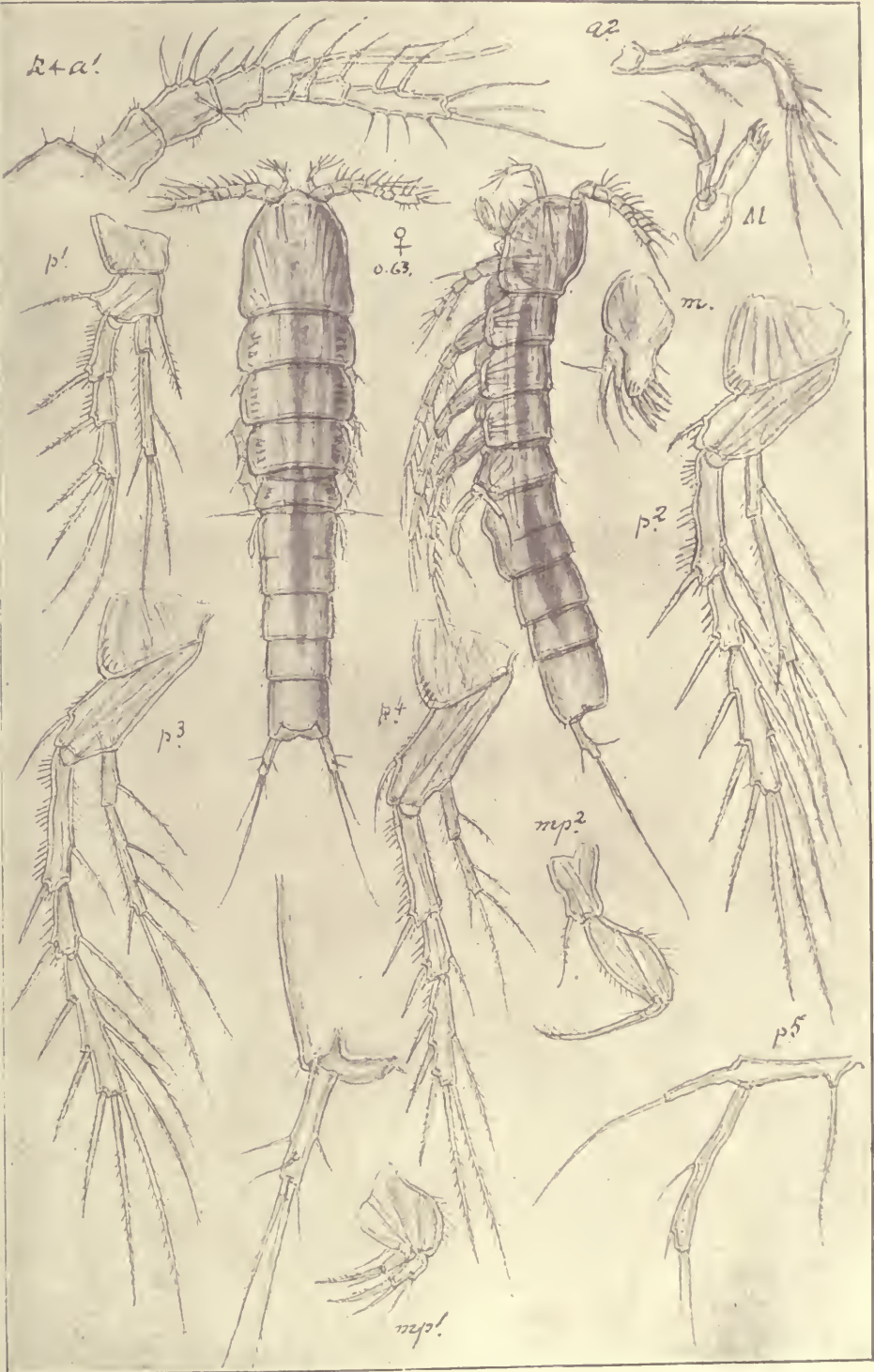
Eurycletodes minutus, G. O. Sars

Copepoda

Cletodidæ

Suppl. Volume

Pl. LXI



G. O. Sars, del.

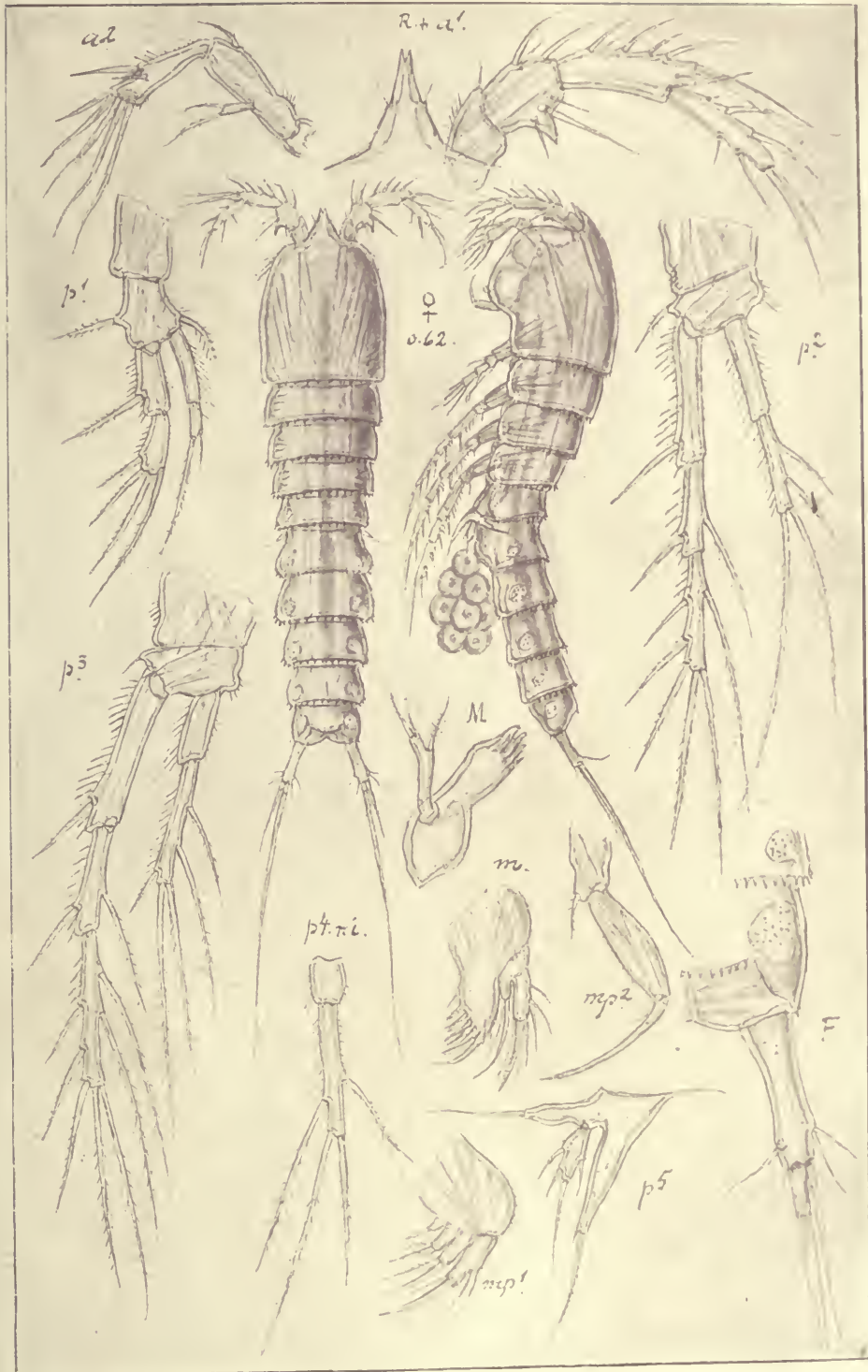
Leptocletodes debilis, G. O. Sars

Copepoda

Cletodidæ

Suppl. Volume

Pl. LXII



G. O. Sars, del.

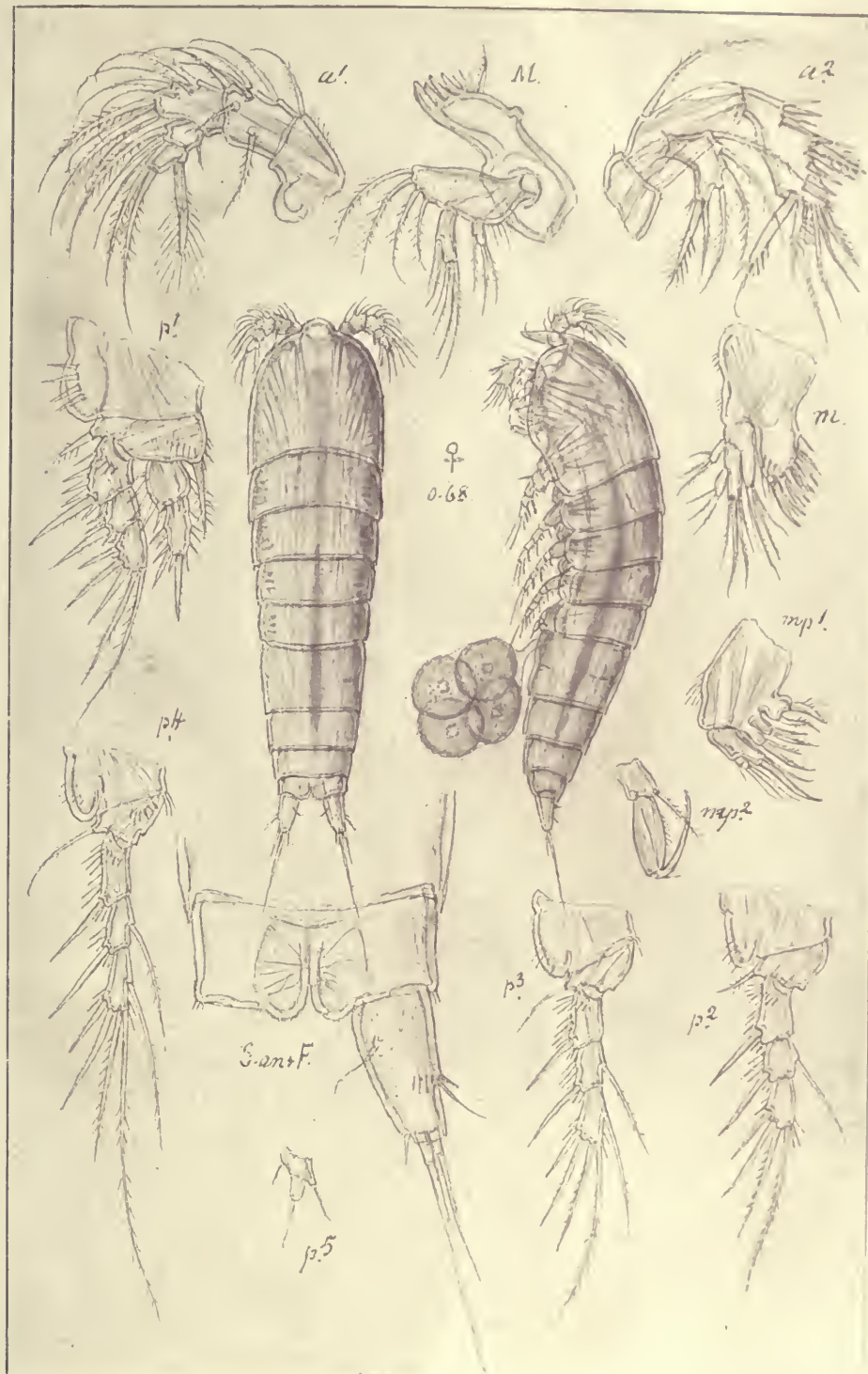
Pseudocletodes typicus, G. O. Sars

Copepoda

Cletodidæ

Suppl. Volume

Pl. LXIII



G. O. Sars, del.

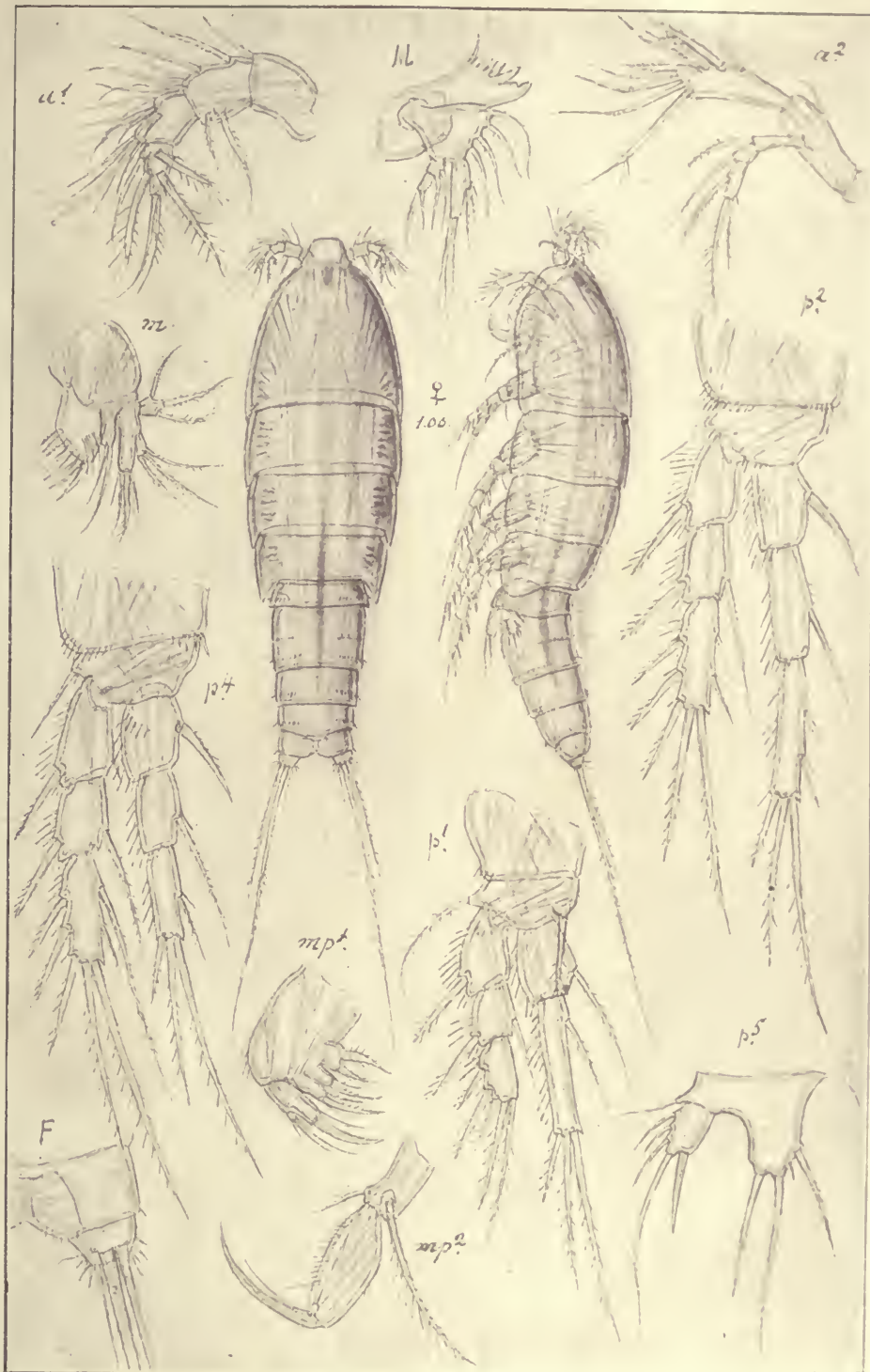
Nannopus abyssi, G. O. Sars

Copepoda

Tachidiidæ

Suppl. Volume

Pl. LXIV



G. O. Sars, del.

Danielssenia robusta, G. O. Sars

75. *Danielssenia robusta*, G. O. Sars, n. sp.
(Pl. LXIV).

Specific Characters.—*Female.* Body comparatively robust, with the anterior division rather dilated and evenly vaulted above. Cephalic segment nearly as long as the 3 succeeding segments combined, and produced in front to a thin rostral plate obtusely rounded and somewhat deflexed at the end. Epimeral plates of the 3 succeeding segments somewhat produced behind. Last trunkal segment very small. Urosome comparatively short, scarcely attaining half the length of the anterior division, and only very slightly tapered behind, its segments minutely denticulate at the hind edges; genital segment about the length of the 2 succeeding segments combined; last segment somewhat smaller than the preceding one. Caudal rami very short, being scarcely half as long as they are broad; apical setæ rather slender. Anterior antennæ, as in the type species, only composed of 4 joints, and exhibiting a very similar structure and armature. Posterior antennæ likewise very similar. Mandibular palp with the basal part considerably expanded, and carrying along the hind edge of the projecting inner part 4 strong ciliated setæ. Maxillæ and maxillepeds scarcely differing in their structure from those parts in the other species. Natatory legs likewise built on the same type, though differing in the inner ramus being somewhat more produced. Last pair of legs comparatively of smaller size than in the other 2 Norwegian species, with the distal joint less broad and having the innermost seta spiniform; inner expansion of proximal joint far less produced, scarcely extending beyond the distal joint, and only provided with 3 marginal setæ.

Colour whitish grey, with a faint rosy tinge.

Length of adult female about 1 mm.

Remarks.—The present form is nearly allied to the other 2 Norwegian species, through more robust in shape, and also of larger size than any of them. The structure of the several appendages agrees on the whole rather closely with that found in the said species, except the last pair of legs, which are of much smaller size and also conspicuously different in shape.

Occurrence.—Several specimens of this large species, most of them of the female sex, were found at Risør in depths ranging from 30 to 60 fathoms, coarse muddy sand.

Gen. **Psammis**, G. O. Sars.

Remarks.—This genus was established by the present author in the year 1911, to include a single species of which at that time only 2 female specimens had come under my notice. I have subsequently had an opportunity of examining also a fully adult male specimen, and, as the sexual differences in this form are rather striking, both as regards the outward appearance and the structure of some of the appendages, I have found it advisable to give below a full description of the specimen accompanied by figures of the whole animal and of some of the structural details.

76. **Psammis longisetosa**, G. O. Sars.

(Pl. LXV).

See Vol. V, p. 339, Pl. CCXXV.

Specific Characters.—*Male.* Body considerably more slender than in female and gradually tapered behind. Cephalic segment about occupying half the length of the anterior division, and provided in front with a well-defined and rather prominent rostral plate of regularly oval form, with 2 delicate sensory hairs on each side. Urosome about equalling in length $\frac{3}{4}$ of the anterior division, and composed of 5 well defined segments, the 4 anterior of which are of about equal size; last segment considerably smaller and somewhat widening distally, with the anal opercle inconspicuous. Caudal rami considerably divergent, with the apical setæ greatly prolonged. Anterior antennæ very strongly built and conspicuously hinged, being apparently composed of 7 joints, the penultimate of which is strongly inflated, almost globose in form; terminal joint narrow unguiform and very mobile, admitting of being impinged against the anterior face of the preceding joint, both together forming a very powerful grasping organ. Posterior antennæ and oral parts scarcely different from those in female. 1st pair of legs also rather similar, only differing in the shape of the spine issuing from the inner corner of the 2nd basal joint, this spine being not, as in the female, straight, but distinctly curved inwards. 2nd pair of legs with the inner ramus conspicuously transformed, each of the joints being produced at the end outside to a well defined acuminate process, that of the middle joint being much the largest, mucroniform, and extending almost to the end of the terminal joint. The 2 succeeding pairs of legs of the very same structure as in the female. Last pair of legs however very different, the distal joint being not, as in the female confluent with the proximal one, but

well defined, rounded in form and carrying 4 slender marginal spines; inner expansion of proximal joint comparatively small, scarcely extending beyond the middle of the distal joint, and only provided with 2 spines of somewhat unequal length.

Length of the specimen examined 0.72 mm.

Remarks.—The identification of the above-described form as the male of *P. longisetosa* cannot be contested, though some of the characters, especially the structure of the last pair of legs, are not in accordance with the diagnosis previously given of the genus.

Occurrence.—The above-described male specimen was, like the female, found at Farsund. I have not met with this form in any other locality on the Norwegian coast.

Gen. *Argestes*, G. O. Sars.

Remarks.—This is another genus originally founded only on a single species, *A. mollis* G. O. Sars, found at Bukken, south west coast of Norway. A slender Copepod recently found off the southern coast seems, according to the structural details, to be referable to the same genus, though in its outward appearance it looks rather different from the type species. A description of this form is given below.

77. *Argestes tenuis*, G. O. Sars, n. sp. (Pl. LXVII).

Specific Characters.—*Female.* Body slender and narrow, with the anterior division only slightly dilated, and the integuments very thin and pellucid. Cephalic segment somewhat exceeding in length the 2 succeeding segments combined, and without any distinctly defined rostral projection. Lateral parts of the 3 succeeding segments rounded off; last trunkal segment smaller than the preceding one. Urosome narrow cylindrical in form, and nearly attaining the length of the anterior division, its segments very finely denticulate at the hind edges, and clothed laterally with delicate adpressed spikes; genital segment comparatively large and conspicuously protuberant below in its anterior part; last segment somewhat larger than the preceding segment and quadrangular in outline, anal opercle very broad and perfectly smooth at the edge. Caudal rami about the length of the anal segment and narrow linear in form, with all the setæ issuing from the slightly thickened extremity, the 2 middle apical setæ very slender. Anterior antennæ nearly as long as

the cephalic segment and, as in the type species, composed of 7 well defined joints clothed with rather strong finely denticulated setæ; the first 2 joints much larger than the others, terminal part, composed of the 3 outermost joints, about half the length of the proximal one, with the last joint the largest. Posterior antennæ comparatively feeble in structure, with the outer ramus rudimentary. Mandibular palp without any distinctly defined outer ramus, its place being occupied by a simple seta. Maxillæ and maxillipeds scarcely different from those in the type species. Natatory legs, as in that species, well developed, with both rami distinctly 3-articulate, being in 1st pair of about equal size, in the succeeding pairs a little unequal, though less so than in the type species. Last pair of legs with the distal joint considerably produced and of narrow linear form, carrying 5 comparatively small marginal setæ, the proximal one of the outer edge rather remote from the others; proximal joint quite short, and not at all expanded inside, with only 2 small juxtaposed bristles on the hind margin.

Male somewhat smaller than female, and resembling it in the general shape of the body, being however easily recognised by the more strongly built and distinctly hinged anterior antennæ.

Colour whitish pellucid.

Length of adult female 0.83 mm.

Remarks.—In its outward appearance this Copepod bears a general resemblance to the form described above as *Leptocletodes debilis*, exhibiting a rather similar slender and narrow shape of the body and a similar week consistency of the integuments. On a closer examination, however, the structure of the several appendages, and more particularly that of the natatory legs, is found to be essentially different, and on the whole perfectly agreeing with that in *Argestes mollis*, with which species it accordingly must be associated in the same genus.

Occurrence.—I have only met with this form in a single locality on the Norwegian coast, viz., at Risør, where some few specimens were taken from the considerable depth of 60—80 fathoms, muddy bottom.

Gen. *Euterpina*, Norman, 1903.

Syn: *Euterpe*, Claus (not Swainson).

Generic Characters.—Body subpyriform in shape, with no very sharply marked limit between the anterior and posterior divisions. Cephalic segment large and acutely produced in front. Urosome comparatively small, with the

caudal rami not much produced, setæ of the latter reduced in number. Anterior antennæ in female of moderate size, and clothed with scattered simple setæ; those in male much larger and very strongly hinged. Posterior antennæ with the outer ramus well defined, though only composed of a single joint. Mandibles rather coarse, with the palp distinctly biramous. Maxillæ without any distinctly defined exopodal and epipodal lobes. Anterior maxillipeds with 3 well defined setiferous lobes inside the basal part. Posterior maxillipeds extremely slender and narrow. 1st pair of legs with both rami short, biarticulate; the 3 succeeding pairs with the rami distinctly 3-articulate, but of rather unequal size. Last pair of legs represented by two undivided juxtaposed plates, which in male are coalesced in the middle.

Remarks.—As the name *Euterpe*, originally assigned to this genus by Claus, had been preoccupied in Entomology, the above slight change of the name has been proposed by the Canon Norman. The genus is somewhat allied to *Tachidius*, differing however in some particulars rather markedly, especially as regards the structure of the posterior maxillipeds and the 1st pair of legs. It comprises as yet only a single species, to be described below.

78. *Euterpina acutifrons*, (Dana).

(Pl. LXVIII).

Harpacticus? acutifrons, Dana, Crustacea of the Un. St. Expedition, p. 1192, Pl. 83, figs. 11 a—b.

Syn: *Euterpe gracilis*, Claus.

Specific Characters.—*Female.* Body comparatively slender, with the anterior division conspicuously broader than the posterior and evenly vaulted above. Cephalic segment occupying about half the length of the anterior division, and gradually exserted in front to a greatly prominent rostral prominence, acute at the tip. Lateral parts of the succeeding segments not expanded. Last trunkal segment much smaller than the preceding one. Urosome not nearly attaining half the length of the anterior division and rather narrow, tapered distally, with the segments minutely denticulated at the hind edges; genital segment about the length of the 2 succeeding segments combined and imperfectly subdivided beyond the middle; last segment scarcely shorter than the preceding one, with the anal opercle finely denticulated at the edge. Caudal rami only slightly longer than they are broad and not at all divergent, each ramus provided near the base with a small subdorsal bristle and at the transversely truncated extremity with 2 rather strong setæ of unequal length. Anterior antennæ about half as long as the cephalic segment and rather narrow,

being composed of 7 well defined joints not much different in size, the terminal one however rather smaller than the others. Posterior antennæ with the basal part distinctly subdivided, terminal joint with the spines and setæ rather slender; outer ramus provided with 4 subequal ciliated setæ. Posterior maxilliped with the hand scarcely at all dilated and about of same size and appearance as the basal joint, dactylus extremely slender, with scattered long hairs inside. 1st pair of legs rather small, and provided with the usual deflexed spine at the inner corner of the 2nd basal joint; rami of about equal size, with the distal joint somewhat larger than the proximal one. The 3 succeeding pairs of legs with the outer ramus rather strongly built and densely fringed outside with small spinules, spines attached to this ramus unusually coarse, 3 of them issuing close together from the end of the terminal joint; inner ramus shorter and much narrower than the outer. Last pair of legs consisting of 2 juxtaposed oblong quadrangular plates, contiguous at the base and fringed inside and at the end with short cilia, each plate having outside, at some distance from the base, a slender bristle and moreover 5 comparatively short and finely denticulated spines, one of them attached to the outer edge in about the middle, the other 4 to the transversely truncated end. Ovisac of moderate size and globular in form.

Male of about same size as female, and not very different in the shape of the body. Anterior antennæ however much more strongly built and pronouncedly hinged, being apparently only composed of 5 joints, the penultimate of which is very large and tumid, sub-pyriform in shape; terminal joint forming a slender and very mobile claw-like dactylus. Posterior antennæ with one of the setæ attached to the outer ramus much stronger than the others, almost claw-shaped. 1st pair of legs differing somewhat from those in the female in the shape of the inner ramus, the proximal joint of which is comparatively more produced and forming with the distal one an abrupt geniculate bend. Last pair of legs rather unlike those in female, being represented by a single median plate, divided at the end by a short incision into 2 small lobules, each carrying 2 short spines. Genital lobes rather prominent, each armed with 2 coarse spines.

Body in both sexes pellucid, without any conspicuous pigmentation. Eye in preserved specimens inconspicuous, but well observable in the living animal, and of a light red colour.

Length of adult female reaching 0.67 mm.

Remarks.—This form has by most authors been recorded under the name *Euterpe gracilis* given to it by Claus; but there cannot be any doubt

that Giesbrecht was right in identifying it with the species previously recorded by Dana as *Harpacticus acutifrons*. It is an easily recognisable form, differing also markedly in habits from most other *Harpacticoida*, being a true pelagic animal.

Occurrence.—Some specimens of this widely distributed Copepod were found in a plankton-sample taken in the Skaggerak, about midways between the Norwegian coast and Skagen, and this occurrence may justify the reception of the present form within the Fauna of Norway.

• *Distribution*.—North Sea (at Helgoland), Atlantic Ocean, Mediterranean, Indian Ocean.

Fam. Clytemnestridæ.

Remarks.—This family has recently been established by A. Scott, to include the genus *Clynemnestra* of Dana, which indeed in several points differs so markedly from the other *Harpacticoida*, that it scarcely can find its place in any of the other families of that division. No other genus referable to this family is as yet known.

Gen. *Clytemnestra*, Dana, 1852.

Syn: *Goniopelte*, Claus.

“ *Goniopsyllus*, Brady.

Generic Characters.—Body more or less slender, tapering distally, with the anterior division conspicuously depressed, its segments, except the last one, being lamellarly expanded and projecting laterally to prominent triangular lappets. Cephalic segment very large, clypeiform, and produced in front to a well defined rostral prominence. Urosome much narrower than the anterior division, and sub-cylindrical in form. Caudal rami comparatively short, with the apical setæ much reduced in size. Anterior antennæ slender and attenuated, composed of 7 or 8 joints; those in male imperfectly hinged. Posterior antennæ with the outer ramus replaced by one or 2 setæ. Mandibles very small, with the masticatory part narrowly exerted and the palp obsolete. Maxillæ much reduced. Anterior maxillipeds with only a single setiferous lobe inside the basal part. Posterior maxillipeds very slender, with the basal part

much produced; hand in female scarcely at all dilated, with the dactylus very small, in male somewhat more strongly developed. Natatory legs slender, with the inner ramus in all of them 3-articulate and longer than the outer, the later in 1st pair uniarticulate, in the succeeding pairs 3-articulate. Last pair of legs forming each a narrow biarticulate stem extended somewhat laterally.

Remarks.—The present genus was established by Dana in the year 1852, to include a peculiar Copepod found in the Pacific. Neither Claus nor Brady recognised Dana's genus, and the generic names proposed by these authors, *Goniopelte* and *Goniopsyllus*, are indeed only synonyms of that genus. The species of the present genus are readily recognised by the peculiar flattened and lacinate shape of the anterior part of the body, caused by the lamellar expansions of the segments, as also by the very short caudal setæ. Of the structural details may be noted the poor development of the oral parts, and the rather anomalous structure of the legs, especially that of the 1st and last pairs. The genus comprises as yet only 2 nearly-allied species, both truly pelagic in habits. One of these species has proved to be referable to the Fauna of Norway, and will be described below.

79. *Clytemnestra scutellata*, Dana.

(Pl. LXIX).

Clytemnestra scutellata, Dana, Crustacea of the U. S. Explor. Expedition, p. 1194, Pl. 83.

Syn: *Goniopelte gracilis*, Claus.

Specific Characters.—*Female.* Body moderately slender and rapidly tapered behind, with the anterior division conspicuously expanded and somewhat flattened. Cephalic segment very large and broad, fully occupying half the length of the anterior division, with the postero-lateral corners triangularly produced; rostral projection rather prominent and obtusely pointed at the end. The 3 succeeding segments successively somewhat diminishing in size, each produced laterally to a prominent triangular lappet pointing obliquely backwards. Last trunkal segment very small, without any lateral expansions. Urosome scarcely attaining half the length of the anterior division and of narrow cylindrical form, though a little tapering in its outermost part; genital segment comparatively large and not subdivided in the middle; last segment about the size of the preceding one and transversely truncated at the end, with the anal opercle very small. Caudal rami fully twice as long as they are broad and somewhat incurved, with the outer distal corner conically produced; outer edge with 2 successive slender spines near the base and a short seta close to the

end; dorsal seta likewise attached near the end; apical setæ 3 in number, the innermost very small, the middle one the longest, though only slightly exceeding the ramus in length. Anterior antennæ very slender and attenuated, exceeding somewhat in length the cephalic segment, and composed of 8 well defined joints clothed with scattered comparatively short setæ, each antenna carrying moreover 5 well developed æsthetascs, one attached in the middle of the 4th joint, 2 to the end of the 5th joint, and 2 to the tip of the very slender terminal joint. Posterior antennæ with the basal part distinctly subdivided, terminal joint comparatively narrow, with the number of spines and setæ reduced; outer ramus replaced by 2 juxtaposed ciliated setæ of equal length. 1st pair of legs wanting the usual spine inside the 2nd basal joint; outer ramus imperfectly developed, only consisting of a single narrow linear joint, not even extending to the middle of the 2nd joint of the inner, and without any spines outside. The 3 succeeding pairs of legs with the 2nd basal joint bent outwards at an angle with the 1st; both rami distinctly triarticulate and very narrow, the inner one being the longer; 1st joint of outer ramus nearly as long as the other 2 combined and in 2nd pair wanting the usual spine outside. Last pair of legs with the distal joint about 3 times as long as the proximal one and very narrow, carrying 6 slender marginal setæ, 2 on the outer edge and 4 on the apex.

Colour (according to Giesbrecht) whitish grey, with a slight rosy tinge.

Length of the specimen examined 1.24 mm.

Remarks.—This is the species first described, and may accordingly be considered as the type of the present genus. It is closely allied to the form recorded by Brady from the Challenger Expedition under the name of *Goniopsyllus rostratus*, which, as stated by Giesbrecht, is another species of the same genus, differing from the one here described in the comparatively shorter caudal rami, as also somewhat in the structure of the antennæ. In Brady's species the anterior ones are only composed of 7 joints, and the posterior one have only a single seta in the place of the outer ramus.

Occurrence.—A solitary female specimen of the present form was found in a sample taken, many years ago, in the upper part of the Christiania Fjord. This is the only instance of the occurrence of the present form off the coasts of Norway. I have never met with it subsequently.

Distribution.—Irish Sea, Atlantic Ocean, Mediterranean, Gulf of Guinea, Indian and Pacific Oceans. ●

CYCLOPOIDA.

Gnathostoma.

Fam. Cyclopinidæ.

Gen. *Cyclopina*, Claus.

Remarks.—On a careful examination of numerous specimens of *Cyclopina* taken in many different places of our coast, I am led to the conclusion that several nearly-allied species have hitherto been confounded, some of them agreeing more closely with *C. gracilis* Claus, some others with *C. longicornis* Boeck. The supposed variability in the 2 said species of the caudal rami I am now not prepared to admit. In all other known Copepoda these appendages exhibit a perfectly constant appearance both as to form and relative size, and indeed furnish one of the best and most reliable characters for distinguishing nearly allied species. This I believe also applies to the species of the genus *Cyclopina*. If therefore any peculiarity in the structure of these appendages is found, this ought in my opinion to be regarded as an infallible indication of specific difference, unless quite gradual transitions could be stated to occur. But, according to my recent investigations, such transitions do not in reality exist. I have already in Vol. VI recorded 2 species closely agreeing with *C. gracilis* in the structure of the several appendages, but easily recognisable by the different appearance of the caudal rami, and I now propose to distinguish 4 other species, 2 of which are likewise closely allied to that species, whereas the other 2 approach nearest to *C. longicornis*.

80. *Cyclopina norvegica*, Boeck.

(Pl. LXIX, Fig. 1).

Cyclopina norvegica, Boeck, Oversigt over de ved Norges Kyster iagttagne Copepoder.
Chr. Vid. Selsk. Forhandl. 1864, p. 247.

Syn: *Cyclops salinus*, Brady.

Specific Characters.—*Female.* Body resembling in shape that of *C. gracilis*, but of rather inferior size, and having the anterior division more

regularly oval in form, with the cephalic segment less contracted in front. Tail comparatively slender, with the genital segment about as long as the 3 succeeding segments combined and very slightly dilated in its anterior part. Caudal rami much shorter than in *C. gracilis*, only slightly exceeding in length the anal segment, and scarcely more than 3 times as long as they are broad; seta of outer edge attached near the middle; innermost apical seta about twice as long as the outermost. Antennæ, oral parts, and natatory legs of a structure very similar to that in *C. gracilis*. Last pair of legs likewise built on the same type as in that species, though, on a closer comparison, exhibiting slight differences in their form, the distal joint being more elongate and more strongly constricted at the base, with the outer apical spine fully twice as long as the inner. Ovisacs of moderate size and closely appressed to the sides of the tail.

Colour uniformly whitish grey.

Length of adult female scarcely exceeding 0.50 mm.

Remarks.—The above described form is unquestionably that briefly announced by Boeck under the name of *C. norvegica* and also observed by several other authors, but regarded by them as identical with *C. gracilis* Claus. The latter species, originally described from the Mediterranean, has also been found by the present author on the Norwegian coast, and is figured in Vol. VI, Pl. IV.

Occurrence.—This is a pronouncedly littoral form, being only found close to the shores and frequently occurring in shallow pools left by the tide. I have met with it in many places, both of our southern and western coasts.

Distribution.—British Isles, bay of Kiel, coast of France, Polar Sea.

81. *Cyclopina brachystylis*, n. sp.

(Pl. LXX, Fig. 2).

Specific Characters.—*Female.* Body comparatively short and stout, with the anterior division broadly oval in form, greatest width occurring somewhat behind the middle. Tail comparatively less slender than in the preceding species, with the genital segment scarcely longer than the 2 succeeding ones combined. Caudal rami very short, not even attaining the length of the anal segment and only slightly longer than they are broad; seta of outer edge attached about in the middle; apical setæ of moderate length, the innermost one a little longer than the outermost. Anterior antennæ comparatively short and, as in the preceding species, only composed of 10 joints, the 6th of which is much the longest, though scarcely attaining the length of the 4 succeeding

joints combined. Last pair of legs resembling somewhat in shape those in the preceding species, but with the proximal joint comparatively less broad and the apical spines more unequal in length. Ovisacs very small and closely appressed to the sides of the tail.

Colour, as stated in a specimen recently taken at Sandefjord, pale yellowish grey with slight darker yellow shadows; anterior antennæ partly tinged with orange.

Length of adult female scarcely exceeding 0.56 mm.

Remarks.—By the very short caudal rami this form has a certain resemblance to *C. Schneideri* Scott (= *C. brevifurca* G. O. Sars), and may indeed on this account easily be confounded with that species. It is however much inferior in size, and moreover well distinguished by the structure of the anterior antennæ, which are comparatively shorter and, as in the preceding species, only composed of 10 joints, whereas these antennæ in *C. Schneideri* are distinctly 12-articulate. The general form of the body also is somewhat different in the two species.

Occurrence.—I have met with this form in several places, both on the southern and western coast of our country, and northwards at least to the Trondhjem Fjord (Bejan). It is found in moderate depths, from 10 to 50 fathoms, but never in the littoral zone.

82. *Cyclopina littoralis*, Brady.

(Pl. LXIX, fig. 3).

Cyclopina littoralis, Brady, Nat. Hist. Trans. Northumberland and Durham, Vol. IV, p. 429. Pl. XVII, figs 9—14.

Specific Characters.—*Female.* Body comparatively slender, resembling in shape that of *C. longicornis*, but rather inferior in size. Tail, including the caudal rami, about the length of the cephalic segment and slightly attenuated behind. Caudal rami much shorter than in *C. longicornis*, not nearly attaining the length of the 2 preceding segments combined, and scarcely more than 4 times as long as they are broad; seta of outer edge attached about in the middle; innermost apical seta more than twice as long as the outermost. Antennæ, oral parts, and natatory legs of a structure very similar to that in *C. longicornis*. Last pair of legs, as in that species, composed of 3 well defined joints, the middle one rather large, with the outer corner conically produced and tipped with a long seta; terminal joint comparatively small and

broadly rounded at the end, which carries 4 ciliated setæ, the innermost of which is the shortest. Ovisacs of moderate size and slightly divergent.

Body of a clear whitish colour and partly ornamented with a fine rosy pigment.¹⁾

Length of adult female scarcely exceeding 0.65 mm.

Remarks.—It is possible that the form observed by Boeck more properly may be referable to the present species. In this case should consequently in strict law the form described in Vol. VI as *C. longicornis* Boeck have a new name. I think however it may be allowed to retain both these names in the sense here proposed. The 2 species are certainly very nearly allied, but may at once be distinguished by the different length of the caudal rami. I have failed to detect any transition in this respect.

Occurrence.—The species occurs along our whole southern and western coast, from the Christiania Fjord at least to Molde. It is always found close to the shores among algæ and sometimes, as stated by Brady, even in pools left by the tide, never, as is the case with *C. longicornis*, at any considerable depth.

Distribution.—British Isles (Brady), Mediterranean (Giesbrecht).

83. *Cyclopina dilatata*, n. sp.

(Pl. LXX, fig. 1).

Specific Characters.—*Female.* Body rather short and stout, with the anterior division unusually dilated and, viewed dorsally, of rounded oval form. Cephalic segment very large, about twice as long as the remaining part of the trunk, and quite evenly rounded in front. Tail comparatively narrow, and occupying nearly half the length of the body; genital segment about equalling in length the 2 succeeding segments combined and slightly widening in front. Caudal rami resembling in shape and relative length those in *C. littoralis*; seta of outer edge, however, attached somewhat in front of the middle. Anterior antennæ comparatively shorter and less attenuated than in the said species, but composed of 19 well defined joints clothed with comparatively short setæ. Posterior antennæ, oral parts, and natatory legs apparently of a structure similar to that in *C. littoralis*. Last pair of legs however, though built on the same type, of a somewhat different appearance, the terminal joint

¹⁾ The colour as signed (in Vol. VI) to *C. longicornis*, applies in reality only to the present species. *C. longicornis* is of a much paler hue.

being of rather larger size, fully as long as the other 2 combined, and obliquely rounded at the end. Ovisacs wanting in the specimens examined.

Colour of the living animal not yet ascertained.

Length of adult female 0.56 mm.

Remarks.—This form also is nearly allied to *C. longicornis*, but may at once be distinguished both from this and the other known species by the unusually broad and expanded anterior division of the body. The structure of the anterior antennæ and of the last pair of legs is also somewhat different.

Occurrence.—Two female specimens only of this form have as yet come under my notice. They were both found in a sample taken at Korskødhavn from a depth of about 40 fathoms.

Fam. Cyclopidae.

Gen. Euryte, Philippi.

84. *Euryte minor*, Scott.

(Pl. LXX, fig. 2).

Euryte longicauda, var. *minor*, Scott, Twenty-third Annual Report of the Fishery Board for Scotland, Part III, p. 143, Pl. X, figs 13, 14.

Specific Characters.—*Female.* Very like *E. longicauda* Philippi, but rather inferior in size and of somewhat more slender form of the body. Anterior division, seen dorsally, rounded oval in outline, with the cephalic segment very large and broadly rounded in front. Rostrum strong and abruptly recurved. Tail including the last trunkal segment, occupying about half the length of the body; genital segment somewhat less broad than in *E. longicauda*, but, as in that species, armed on each side in the middle with a strong dentiform projection curving backwards; anal segment scarcely longer than the preceding one. Caudal rami resembling in shape those in *E. longicauda*, being rather narrow and elongated, diverging somewhat in their outer part. Antennæ oral parts, and legs of a structure very similar to that in the type species. Ovisacs narrow oblong in form, and somewhat less strongly divergent than in *E. longicauda*.

Male of smaller size than female and a little more slender of form, with the cephalic segment less broad in front and the tail composed of

5 well defined segments. Genital segment considerably dilated, almost quadrate in form, and, as a rule, containing on each side an oblong oval spermatophore. Caudal rami comparatively shorter than in female. Anterior antennæ very strongly hinged.

Colour whitish grey, with a very slight pale yellow tinge.

Length of adult female scarcely attaining 1 mm.; that of male 0.78 mm.

Remarks.—This form was considered by Scott and also by myself as only a variety of *E. longicauda*. I am however now of opinion that it should more properly be regarded as a separate, though closely allied species.

Occurrence.—I have met with this form in many different places of our coast, and have always found its characters constant. It is, unlike *E. longicauda*, a true deep-water form, occurring in depths ranging from 20 to 50 fathoms, never in the littoral zone.

Distribution.—Scottish coast (Scott).

Siphonostoma.

Fam. Ascomyzontidæ.

Gen. Rhynchomyzon, Giesbr.

85. *Rhynchomyzon falco*, Giesbr.

(Pl. LXXI).

Rhynchomyzon falco, Giesbrecht, Die Asterocheriden des Golfes von Neapel, p. 102, Pl. 5, figs. 28—40.

Specific Characters.—*Male.* Body comparatively robuste, with the anterior division rather broad in the middle and somewhat depressed. Cephalic segment very large, about twice as long as the remaining part of the trunk, and, seen dorsally, triangular in outline, being gradually contracted anteriorly, with the extremity narrowly truncated; lateral corners slightly produced, bidentate. Rostrum very strong, falciform, and curved downwards. The 3 succeeding segments, like the cephalic segment, somewhat raised dorsally at the hind edge, and having the lateral corners produced to triangular recurved lappets. Last trunkal segment, as usual, much smaller than the preceding ones,

and slightly produced on each side. Tail comparatively short, not attaining half the length of the anterior division, and composed of 5 segments, the 1st (genital) of which is broadly quadrangular in form and provided at the hind corners with 2 juxtaposed setæ of unequal length; each of the 2 succeeding segments produced laterally to acute triangular lappets curved backwards; the last 2 segments firmly connected and without any lateral projections. Caudal rami comparatively short, being only slightly longer than they are broad, and somewhat divergent; apical setæ not much elongated. Anterior antennæ not nearly attaining the length of the cephalic segment, and scarcely at all hinged, being composed of 17 joints, the 1st of which is much the largest, the 9th imperfectly subdivided in the middle; proximal half of the antenna somewhat thickened and clothed in front with scattered rather strong spiniform setæ, carrying moreover 8 very slender recurved æsthetascs; penultimate joint with a single such æsthetasc behind near the end. Posterior antennæ resembling in structure those in the 2 other known species. Oral cone, as in *R. purpurotinctum*, very massive and prominent, but not prolonged in any true siphonal tube. Mandibles rather strong, pronouncedly cultriform, and finely denticulated inside the extremity; palp very small. Maxillæ, maxillipeds and natatory legs of the usual structure. Last pair of legs extremely small, biarticulate.

Colour of the living animal not yet ascertained.

Length of the specimen examined 1.25 mm.

Remarks.—I think I am right in determining the above-described remarkable form as the hitherto unknown male of *R. falco* Giesbrecht. It may easily be recognised from the other 2 Norwegian species described in Vol. VI by the robust form of the body, by the strongly marked armature of the segments, and by the comparatively short caudal rami.

Occurrence.—The solitary specimen obtained was found in a sample taken at Risør from a depth of about 30 fathoms.

Distribution.—Gulf of Naples (Giesbrecht).

Fam. Acontiophoridae.

Gen. Acontiophorus, Brady.

86. *Acontiophorus ornatus*, Brady.

(Pl. LXXII).

Ascomyzon ornatum, Brady & Robertson, British Assoc. Report p. 197.

Specific Characters.—*Female.* Body on the whole of a more robust appearance than in *A. scutatus*, with the anterior division broadly oval in form and somewhat depressed, greatest width considerably exceeding half the length and occurring behind the middle. Cephalic segment very large, nearly twice the length of the trunk, and narrowly rounded in front, lateral corners slightly produced. The 3 succeeding segments comparatively broad, with the epimeral plates somewhat expanded and distinctly angular behind. Last trunkal segment very small. Tail slightly exceeding in length $\frac{1}{3}$ of the anterior division; genital segment about occupying half the length of the tail and almost of equal width throughout, lateral corners of this and the succeeding segment acutely produced behind. Caudal rami comparatively short, being scarcely longer than they are broad; apical setæ well developed and partly finely plumose. Anterior antennæ much more slender and elongated than in *A. scutatus*, and composed of 16 well defined joints, the 3rd of which is much the largest; proximal part of the antenna only slightly dilated and clothed with strong partly ciliated setæ. Posterior antennæ likewise comparatively more slender than in the type species, though of rather similar structure. Siphonal tube scarcely extending beyond the anterior division of the body. Oral appendages and natatory legs on the whole built on the same type as in *A. scutatus*. Last pair of legs, however, of comparatively larger size, with the proximal joint very broad, lamellar, and irregularly indented behind; distal joint oval in form and provided with 5 ciliated setæ of about equal length.

Colour of the living animal not yet ascertained.

Length of adult female 1.03 mm.

Remarks.—This form was at first recorded by Brady and Robertson under the name of *Ascomyzon ornatus*, and was subsequently redescribed and figured by the first-named author in his well-known Monograph as *Acontiophorus armatus*. As however the specific name *ornatus* is the older one; it must be retained for the present form. The differences between this species and *A. scutatus* are very pronounced, and at first I therefore believed them to

be of generic value. I am however now disposed to include both species in the same genus.

Occurrence.—A solitary female specimen only of this pretty form has as yet come under my notice. It was found in a sample taken at Risør in about the same place, where *Rhyncomyzon falco* occurred.

Distribution.—British Isles (Brady), Mediterranean (Giesbrecht).

Poecilostoma.

Fam. Lichomolgidae.

Gen. *Hermannella*, Canu.

87. *Hermannella dubia*, n. sp.

(Pl. LXXIII, fig. 1).

Specific Characters.—*Male*. Anterior division of body rather broad, sub-depressed, seen dorsally broadly oval in outline, with the greatest width equalling $\frac{2}{3}$ of the length and occurring in front of the middle. Cephalic segment very large, fully twice as long as the 3 succeeding segments combined, and evenly rounded in front, exhibiting behind the middle a well-marked transverse suture. Last trunkal segment very small. Tail about equalling in length $\frac{2}{3}$ of the anterior division, and composed of 5 well defined segments, the 1st of which (the genital segment) is very large and expanded, almost circular in outline, exhibiting on each side a roomy chamber for the reception of the spermatophores; the remaining segments narrow cylindrical in form, the last being the largest. Caudal rami about 3 times as long as they are broad and scarcely at all divergent; seta of outer edge attached in the middle; apical setæ partly broken in the specimen examined, but apparently normal. Anterior antennæ less slender than in the other known species, scarcely exceeding half the length of the cephalic segment, and only composed of 6 joints. Posterior antennæ not very strong, and composed of 4 well-defined joints, the 2nd of which is the largest; 3rd joint armed at the end anteriorly with a hook-like spine accompanied proximally by 2 small bristles; last joint of about same size and provided at the tip with 4 curved claws, 2 of which

are distinctly jointed in the middle; outside the latter a slender curved seta is attached. Maxillæ with the masticatory lappet fusiform in shape and exerted to a very long and narrow setiform lash, inner edge armed with about 8 strong curved denticles, outer edge ciliated; palp of the usual appearance. Anterior maxillipeds with the distal joint gradually tapered and provided inside with a stout spine, terminal process only slightly curved and armed outside with 4—5 unusually slender spinules. Posterior maxillipeds exhibiting the structure usual for male specimens. The 3 anterior pairs of natatory legs on the whole of normal appearance, with the rami comparatively broad and subequal in size; 4th pair however distinguished by the want of the outer-edge spines on the outer ramus, inner ramus scarcely narrower than the outer and having 2 setæ inside the middle joint, terminal joint with 3 unusually slender spines at the end and with the inner edge smooth. Last pair of legs with the free joint narrow linear in form and carrying at the tip a slender spine and a somewhat shorter seta, inner distal corner produced to a well-marked dentiform projection.

Colour of the living animal not yet ascertained.

Length of the specimen examined 0.70 mm.

Remarks.—The above-described form cannot be referred to any of the hitherto known species, differing, as it does, conspicuously by the comparatively short 6-articulate anterior antennæ, as also by the structure of the posterior antennæ and that of the 4th pair of legs. In the broadly expanded anterior division of the body it somewhat resembles *H. valida* G. O. Sars, but is otherwise very different from that species.

Occurrence.—The solitary male specimen obtained was found in a sample taken by Mr. Kjær at Drøbak from a depth of about 50 fathoms.

Gen. *Lichomolgella*, G. O. Sars.

88. *Lichomolgella pusilla*, G. O. Sars.

(Pl. LXXIII, fig. 2).

See: Vol. VI, p. 216, Pl. CXVIII, fig. 1.

Remarks.—This dwarfed form has been described and figured in Vol. VI from a solitary specimen taken at Skutesnæs, S. W. coast of Norway. On the accompanying plate I give new habitus-figures with some details of another specimen obtained on the south coast, at Lillesand. As seen from the figure, the lateral view of the body is rather characteristic by the unusually deep

and boldly vaulted cephalic segment giving the animal in that situation a very extraneous appearance. The specimen, though fully adult, did not exceed a length of 0.40 mm.

Gen. **Pseudomolgus**, G. O. Sars.

89. **Pseudomolgus arenicola**, Brady.

(Pl. LXXIV).

Lichomolgus arenicolus, Brady, Monogr. of British Copepoda, Part III, p. 46, Pl. LXXXVIII, figs 1—7.

Specific Characters.—*Female*. General form of body very like that in *P. leptostylis* G. O. Sars¹⁾, though, perhaps a little less slender, with the anterior division more regularly oval in outline, the greatest width occurring in the middle. Head very distinctly defined from the 1st trunkal segment and narrowly truncated at the extremity. Last trunkal segment remarkably narrow and elongated. Tail about equalling in length the head and 1st trunkal segment combined; genital segment fusiform in shape and distinctly subdivided in the middle by a transverse dorsal suture; anal segment only slightly longer than the preceding segment. Caudal rami much shorter than in *P. leptostylis*, not nearly attaining the length of the 2 preceding segments combined, and about of equal width throughout. Anterior antennæ rather slender and, as in the 2 other species, composed of 7 joints, the somewhat oblique suture between the last 2 joint being distinctly marked. Posterior antennæ very powerful, and agreeing both in form and armature with those in *P. leptostylis*. Anterior lip deeply insinuated in the middle. Maxillæ with the 2 proximal denticles of the principal masticatory lappet somewhat lamellar in shape, their inner sharpened edge being divided into 3 or 4 fine spinules; palp of a somewhat irregular form, and having in the middle of the rounded extremity a well-marked narrow incision. Maxillipeds and legs almost exactly as in *P. leptostylis*.

Body semipellucid, of a uniform whitish grey colour, with darker translucent ovaria. Eye well observable, with light reddish pigment.

Length of the specimen examined 1.60 mm.

Remarks.—I cannot doubt that the above-described form is identical with the British species recorded by Brady and by Scott, though the description and figures given by those authors do not fully agree with those here given. The species is indeed still more closely allied to *P. leptostylis* than I had

¹⁾ See Vol. VI, p. 182, Pl. CIII.

formerly supposed by consulting the statements given by the said authors. Yet the species may at once be distinguished both from this and the other species (*P. dilatatus*) by the much shorter and stouter caudal rami.

Occurrence.—A solitary fully adult female specimen of this form was taken last summer at Hvalør, outside the Christiania Fjord, from a depth of about 10 fathoms.

Distribution.—British Isles (Brady, Scott).

Fam. Sapphirinidæ.

Gen. *Sapphirina*, Thompson, 1829.

Generic Characters.—Body more or less conspicuously depressed and rather unlike in the two sexes, that of male much broader than in female and blade-like, with the epimeral plates of both the anterior and posterior divisions lamellarly expanded, exhibiting moreover, in the living animal, a beautiful iridescent or opaline lustre. Head generally well defined from the 1st trunkal segment, and provided in front with 2 closely set cuticular lenses (conspicilla), behind which, as in *Corycæus*, at some distance 2 rod-like, pigmented strings occur, each terminating in a highly refractive body.¹⁾ Tail much narrower in female than in male, and in both sexes composed of 5 well defined segments. Caudal rami blade-like, with the marginal setæ very small. Anterior antennæ alike in the two sexes, and rather short, with the number of joints somewhat reduced. Posterior antennæ distinctly prehensile, terminating in a short and stout claw. Oral parts built on the very same type as in the *Lichomolgidæ*. Natatory legs well developed and more or less incurved, with both rami 3-articulate. Last pair of legs very small, uniarticulate, extended laterally.

Remarks.—This genus was established by I. V. Thompson as early as the year 1829, when our knowledge of the marine Copepoda was still very imperfect. The species observed by that zoologist (*S. indicator*) cannot be identified; but it is evident that he has had before him male specimens of some species belonging to the present genus, the brilliant iridescence of their bodies having at once attracted his attention.—The genus comprises numerous

¹⁾ As to the significance of this apparatus, I may refer to the note given in Vol. VI, p. 195,

species, chiefly occurring in the equatorial parts of the Oceans, though sometimes by currents thrown more or less out of their true home. They are all pronouncedly pelagic animals, being as a rule met with in the open sea, near the surface of the water. As is the case with the other poecilostomous Cyclopoida, they are semiparasitic in habits, the females being at times found within the pallial cavity of various pelagic *Tunicata* (Salpæ, Pyrosoma etc.). More generally however they are taken free in the sea, and this is always the case with the males. .

90. *Sapphirina iris*, Dana.

(Pl. LXXV & LXXVI).

Sapphirina iris, Dana, United States Explor. Expedition, Crustacea, p. 1239, Pl. 87, figs. 1 a—d

Syn: *Sapphirina salpæ*, Claus.

„ *gemma*, Brady (not Dana).

Specific Characters.—*Female.* Body elongate, gradually tapered behind, with all the segments sharply marked off from each other. Head defined from the 1st trunkal segment by a distinct, somewhat flexuous suture, and obtusely rounded in front; conspicilla well marked and closely approximate. Epimeral plates of the 3 middle trunkal segments distinctly prominent and obtuse-angular behind. Last trunkal segment much smaller than the preceding ones, but well defined. Tail rather narrow, exceeding somewhat half the length of the anterior division, and composed of 5 sharply defined segments, the genital segment being distinctly subdivided in the middle; lateral corners of this and the 3 succeeding segments angular behind; anal segment exceeding in size the preceding segment and quadrangular in form. Caudal rami rather large, attaining the length of the 2 preceding segments combined, and oblong oval in outline, with the inner edge much more curved than the outer and slightly angular at the end; seta of outer edge attached about in the middle, dorsal seta placed much nearer the extremity. Anterior antennæ comparatively short and stout, gradually tapered distally, being composed of 5 joints, the 2nd of which is much the largest, occupying about half the length of the antenna. Posterior antennæ rather strong, with the terminal part (composed of the last 2 joints) much shorter than the preceding joint; apical claw short and stout, accompanied in front by 2 small bristles. Natatory legs with both rami well developed and of nearly equal size. Last pair of legs represented on each side by a small conical joint tipped with 2 unequal bristles. Ovisacs very long and narrow, almost cylindric in shape, and containing numerous ova.

Male rather unlike the female in its outward appearance, the body being very thin, blad-like, and broadly oval in outline, with the epimeral plates of all the segments, except the last trunkal and the last caudal one, lamellarly expanded and closely contiguous. Last trunkal segment very small and almost wholly concealed by the neighboring segments. Last caudal segment likewise much smaller than in female. Conspicilla less sharply marked, and somewhat remote from the frontal margin. Posterior maxillipeds, as usual, more fully developed than in female, with the apical claw long and slender.

Body of female (according to Giesbrecht) of a somewhat opaque yellowish grey colour, with pale reddish ovaria and ovisacs; that of male highly pellucid and, in the living state, brilliantly iridescent.

Length of female attaining 7.40 mm.; that of male 7.10 mm.

Remarks.—This is much the largest of the known species, and in the adult state it may thereby be easily recognised. In the general form of the body, however, as also in the structure of the several appendages it agrees very nearly with some of the other species, for instance *S. gemma* Dana, with which it was indeed identified by Brady. The *S. salpæ* of Claus is quite certainly the present species.

Occurrence.—The present form, it is true, has not yet been recorded from the Norwegian coast, nor have I myself ever met with it here. I think, however, that it notwithstanding ought to be included in the Norwegian fauna as an occasional visitor. For it not seldom happens that shoals of *Salpæ* (*S. runcinata*, Chamisso) by heavy gales and currents are thrown from the open sea to certain points of our western coast, and, as the present copepod is a constant companion of *Salpæ*, it is very likely to believe that it also in such cases has been associated with these pelagic Tunicata¹). The figures here given are drawn from specimens taken during the Monaco Expeditions in the North Atlantic Ocean.

Distribution.—North and South Atlantic, Mediterranean, Indian Ocean, Pacific.

¹), My late father once witnessed such an influx of *Salpæ* at Florø, where he at that time was settled as a pastor, and on a drawing made by him of a *Salpa* a parasite was indeed sketched within the pallial cavity, the relatively large size of this parasite supporting the suggestion that in fact it might have been a female of the present species of *Sapphirina*.

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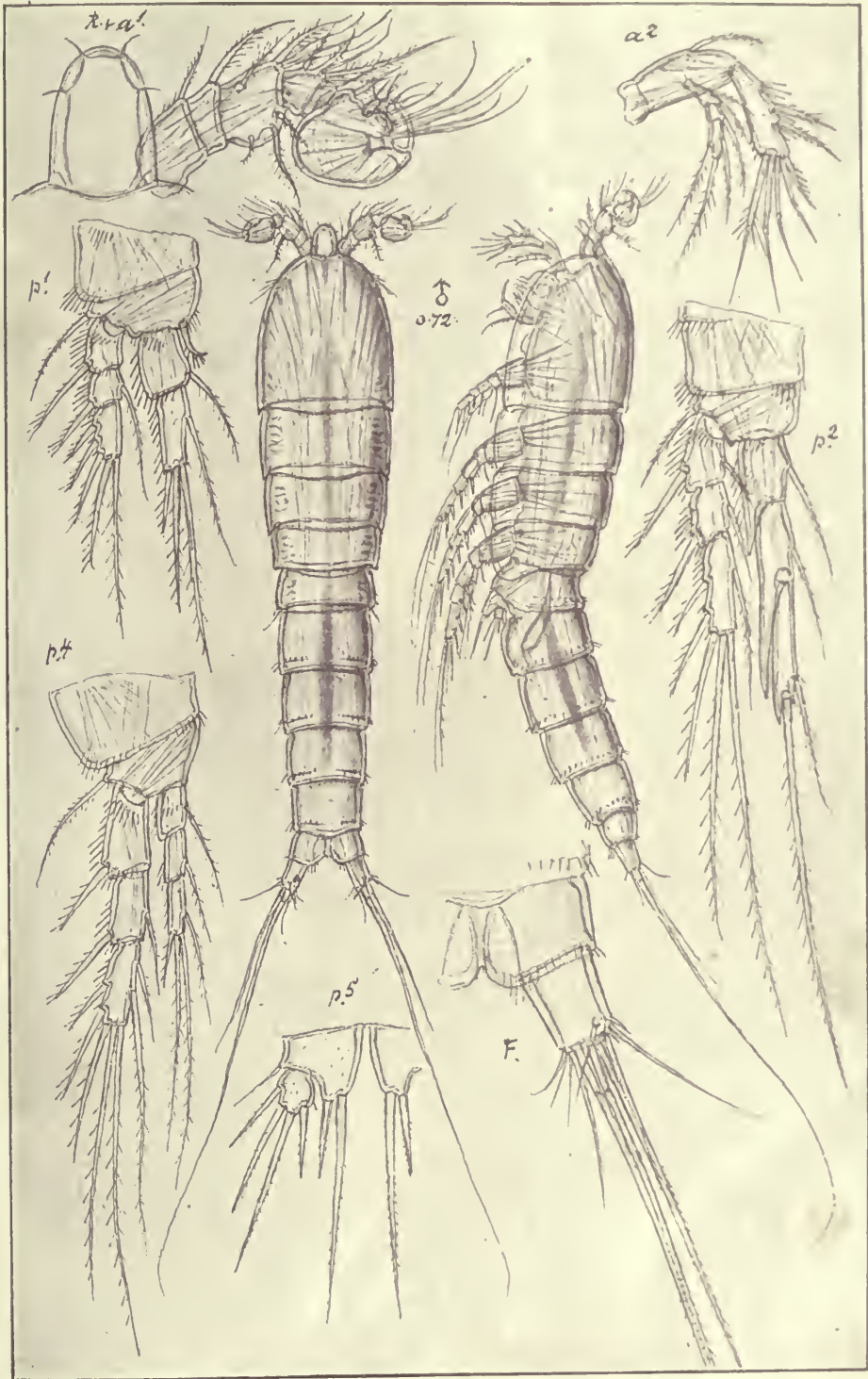
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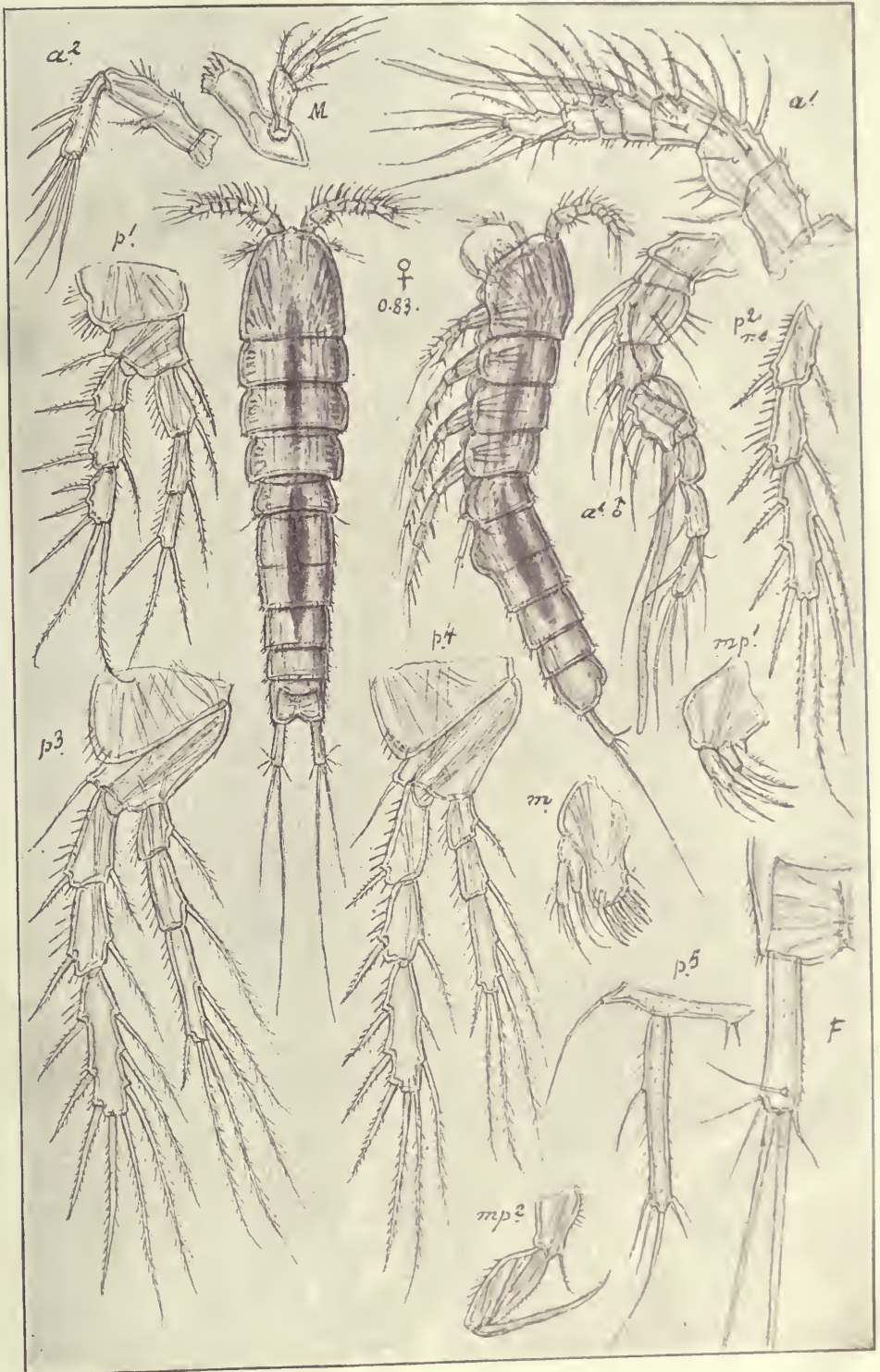
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Tachidiidæ

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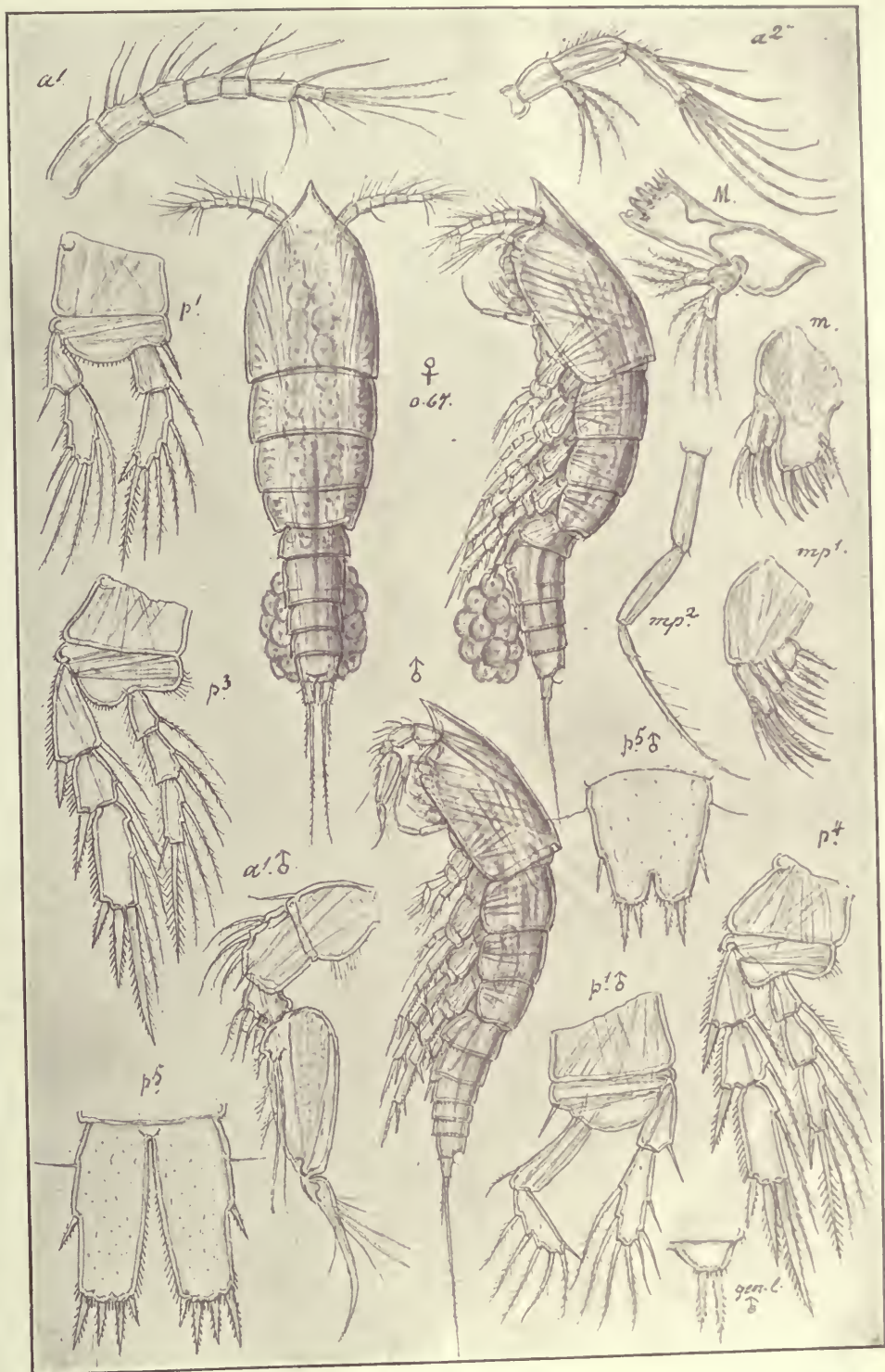
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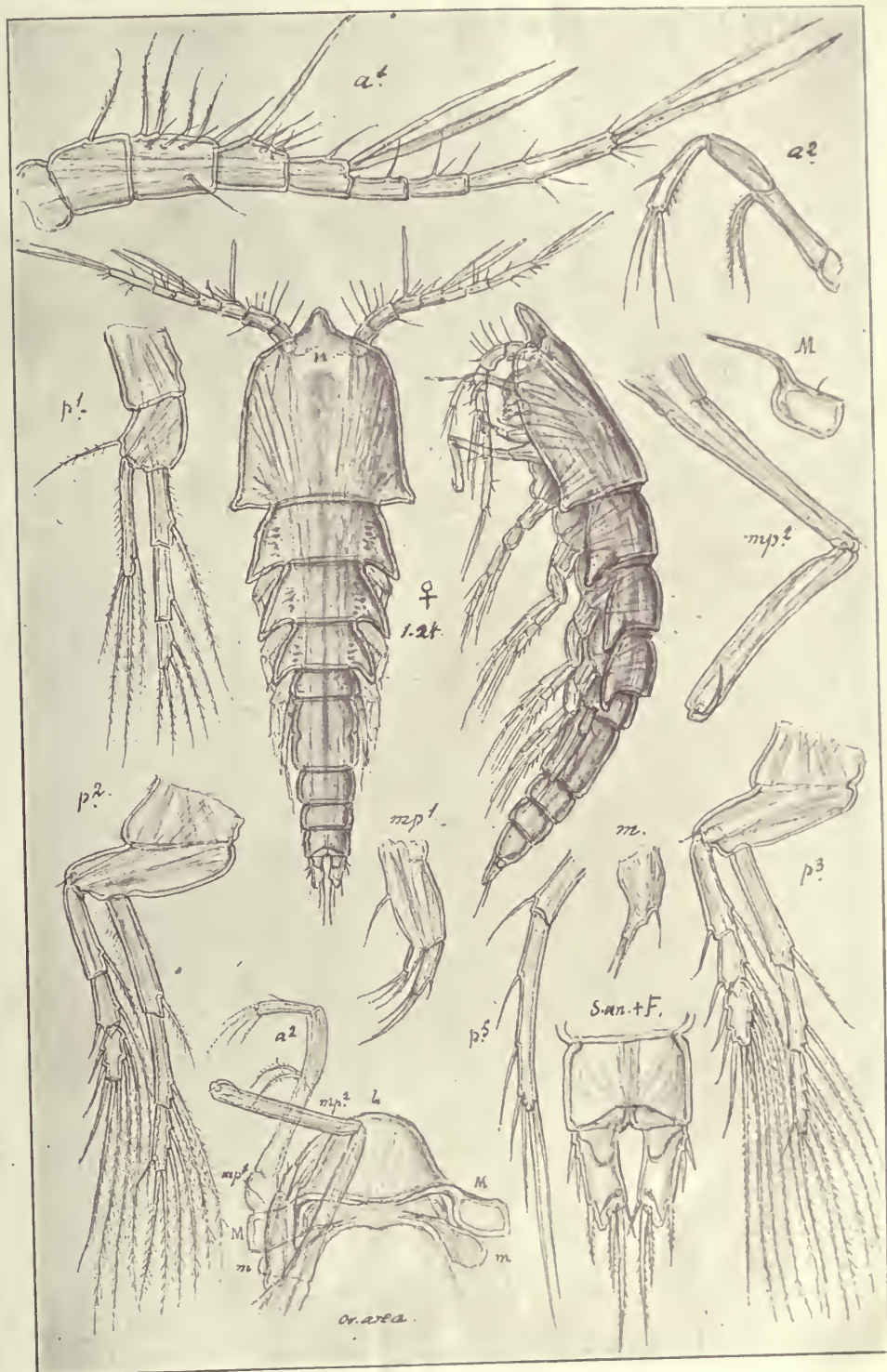
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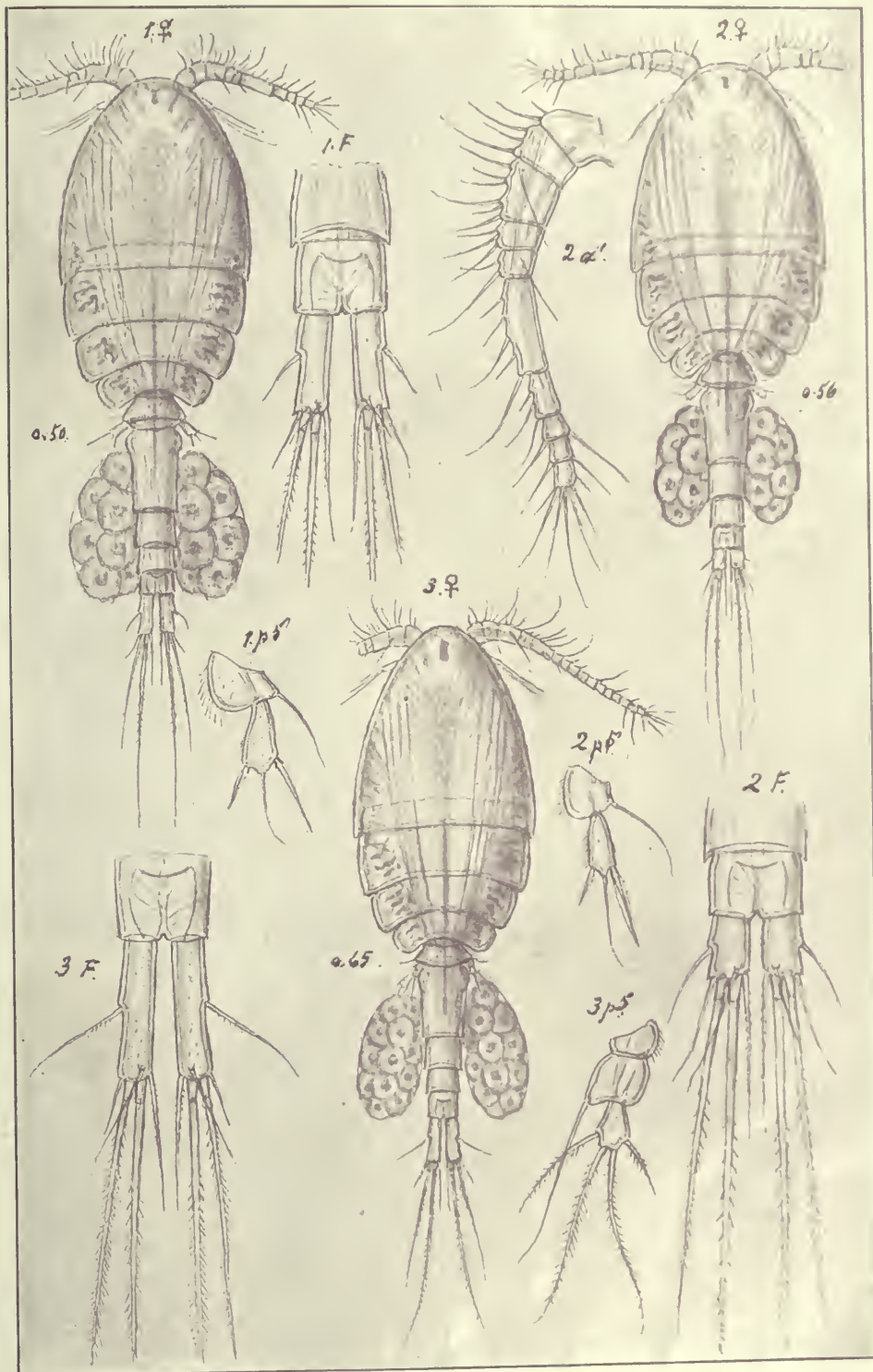
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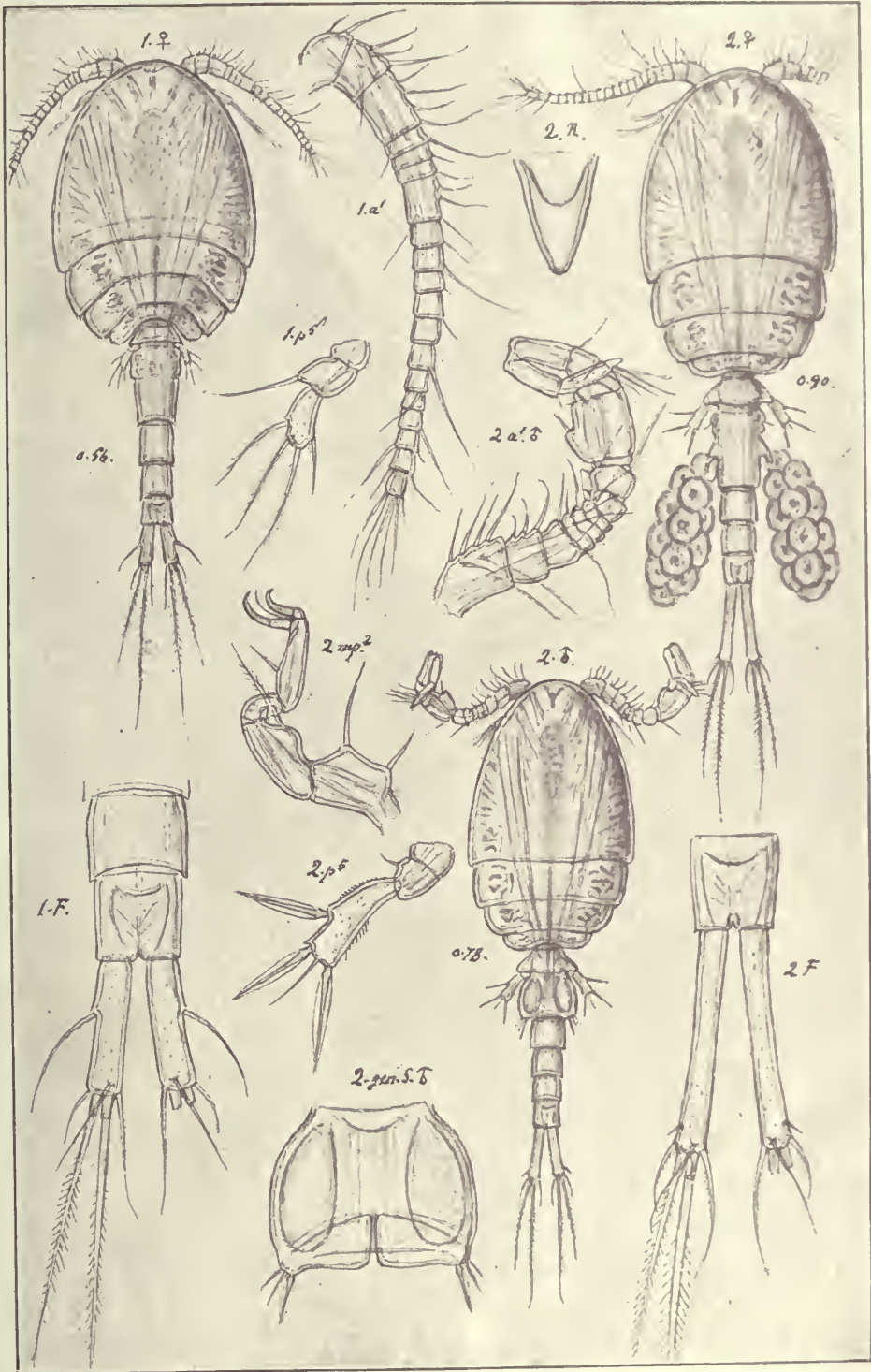
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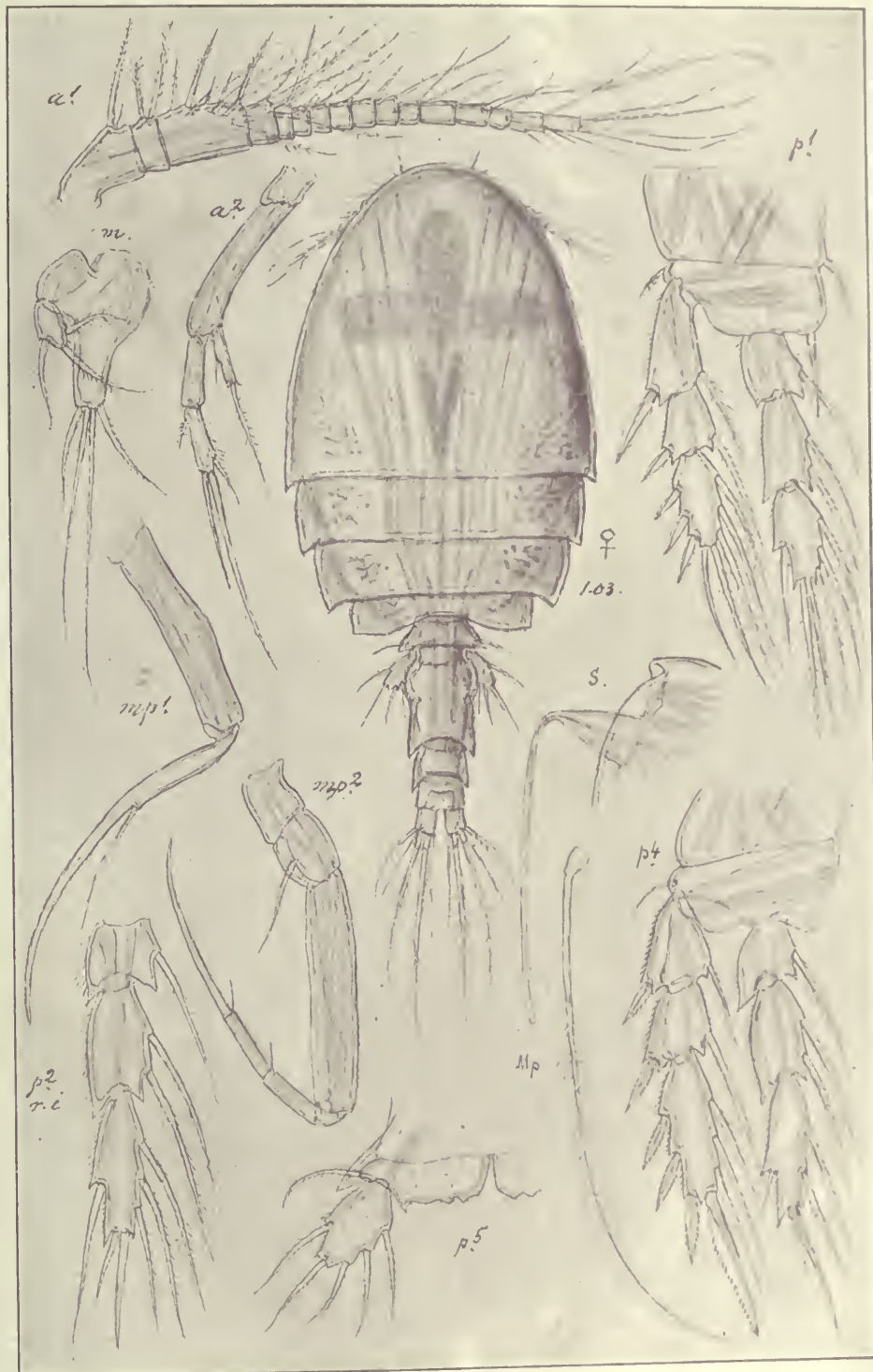
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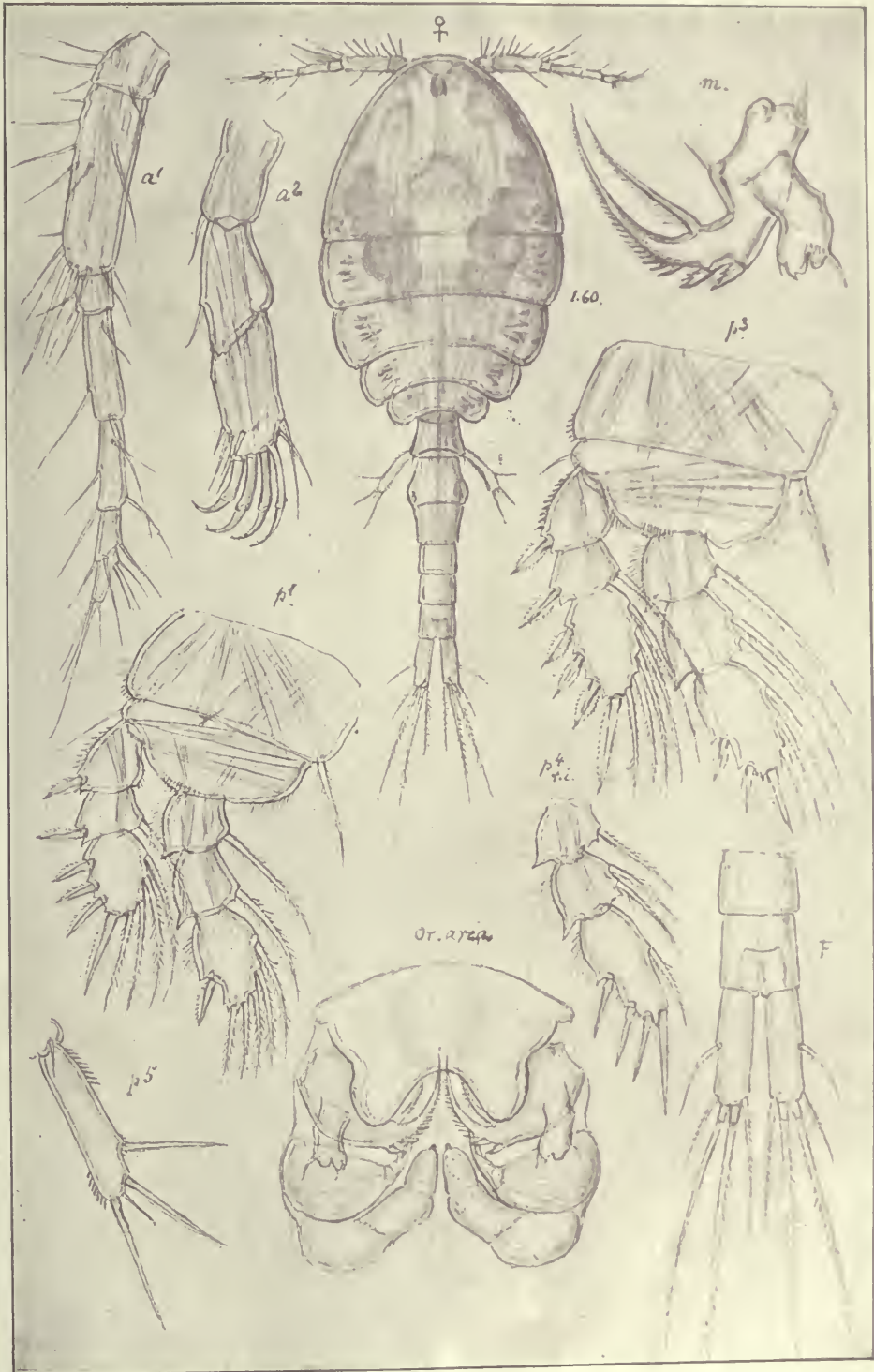
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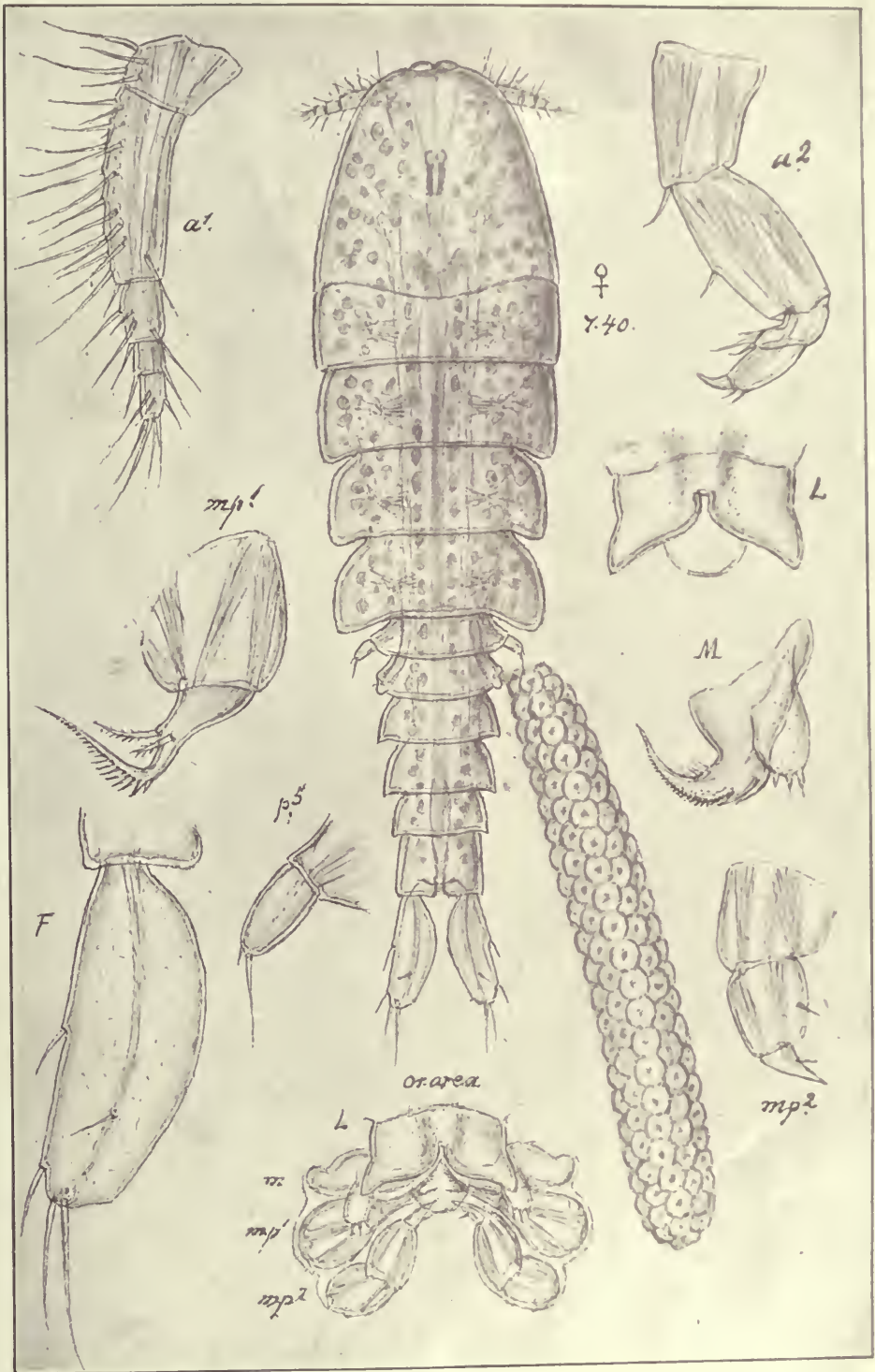
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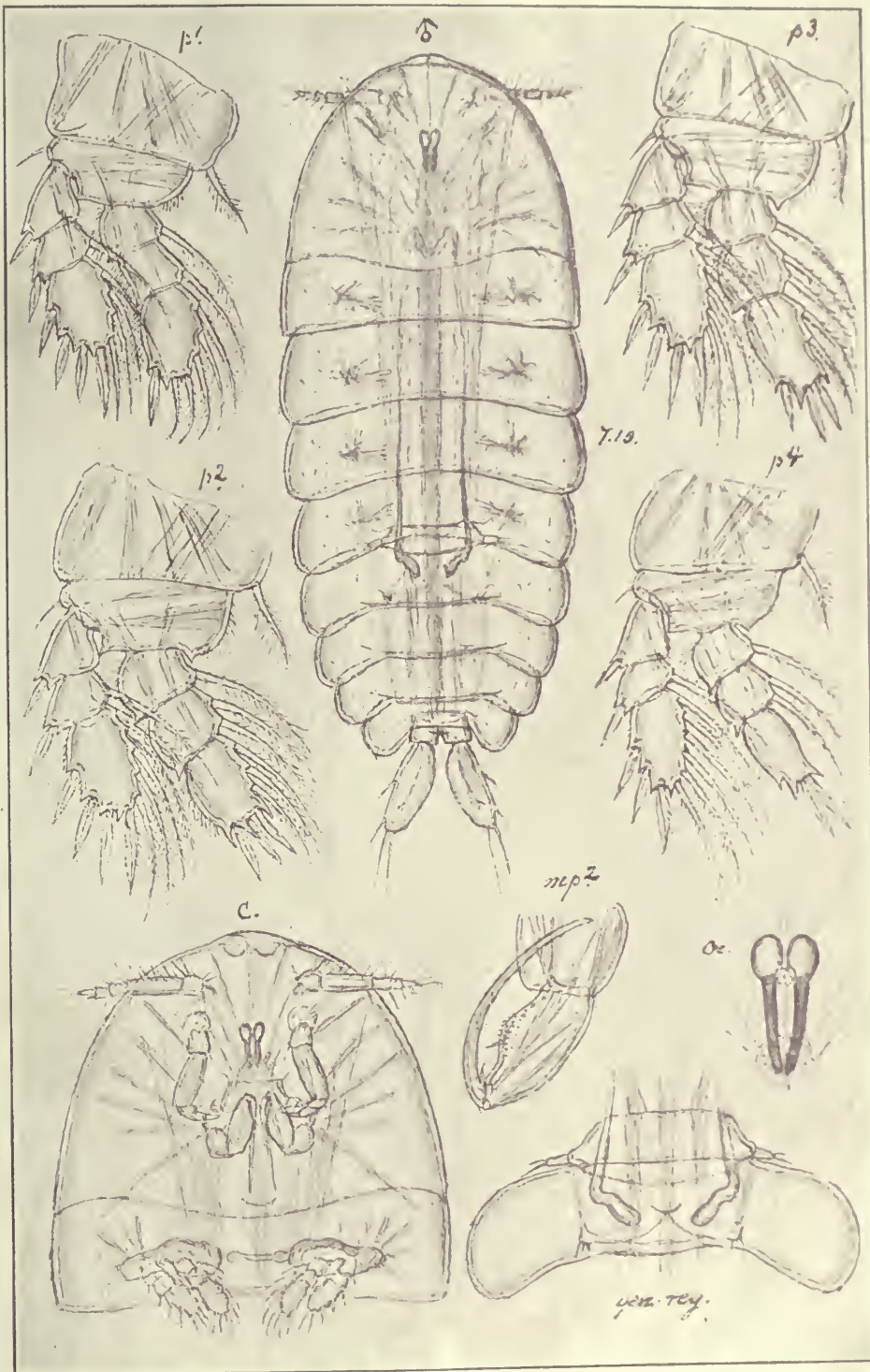
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Sapphirina iris, Dana ♂

CYCLIST

AN ACCOUNT
OF THE
CRUSTACEA
OF
NORWAY

2

AN ACCOUNT
OF THE
CRUSTACEA
OF
NORWAY

WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY

G. O. SARS

PROFESSOR OF ZOOLOGY AT THE UNIVERSITY OF CHRISTIANIA

VOL. VIII

COPEPODA

MONSTRILLOIDA & NOTODELPHYOIDA

WITH 37 AUTOTYPIC PLATES



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BERGEN, A.S. JOHN GRIEBS BOKTRYKKERI OG N. NILSSEN & SØN

PREFACE.

By this Volume I definitely conclude my Account of the Norwegian *Copepoda*, it being my purpose in the next Volume to enter upon an entirely different group of Crustacea, viz., the *Ostracoda*. Although my Account of the former group has required no less than 5 Volumes, and more than 500 species have been described, I do not by any means imagine, that it gives a fully exhaustive record of the existing forms, and I am indeed convinced that many interesting species still remain to be detected, especially of the smaller deep-water Harpacticoida and of the semiparasitic forms. Yet, I hope that my Account may have thrown some light on this formerly much neglected part of our Fauna, and that it may serve as the basis for further investigations.

As to the two anomalous groups treated of in the present Volume, no record whatever has as yet been given on the Norwegian forms belonging to them.

I will not omit, also on this occasion, to tender my most sincere thanks to the Direction of the Bergen Museum for the interest, it still shows for the progress of my work.

G. O. Sars

INTRODUCTION.

In the present volume I propose to give an account of 2 anomalous groups of *Copepoda*, viz., the *Monstrilloida* and the *Notodelphyoida*, the systematic position of which has not been fully recognised by earlier authors. In the more recent classification of the *Copepoda* proposed by Giesbrecht, and now generally adopted by carcinologists, only the systematic rank of families is allotted to these groups, and they are both, together with several other heterogeneous families, comprised within the 2nd tribe of this suborder *Podoplea*, to which the name *Ampharthrandria* is given. I have otherwise shown, that the principles upon which Giesbrechts classification is founded do not at all hold good in every case, and this is also proved in regard to the *Copepoda* here in question. It may be that the name *Ampharthrandria* is applicable to the *Monstrilloida*; but this is by no means the case with the *Notodelphyoida*, this group comprising many forms with the anterior antennæ quite alike in the 2 sexes. Moreover, the genus *Thaumatopsyllus* among the *Monstrilloida* differs conspicuously even in the principal character by which the 2 suborders *Gymnoplea* and *Podoplea* are distinguished by Giesbrecht, viz., the mutual relation between the anterior and posterior divisions of the body. The many essential characters distinguishing the 2 groups here treated of, both from each other and from the other known *Copepoda*, have led me to the conclusion, that they ought to be raised to the rank of distinct divisions, to be again subdivided into real families. The relation of these divisions to other known groups of *Copepoda* is somewhat obscure, though in some instances a tendency towards the Cyclopoid type is unmistakable. On the other hand, by an extreme degradation of the whole body and its appendages, some forms belonging to the *Notodelphyoida* acquire an appearance, strongly recalling that of the *Lernæoida*. All the forms here in question are in some measure parasitic in habits. But the parasitisme is of a very different kind in the

2 divisions. The *Monstrilloida* are, according to the interesting observations of Malaquin, in their juvenile state true endoparasites, living as simple, sac-like bodies in the blood-vessels of some invertebrate animals (Annelids), whereas in the adult state they are freely living pelagic animals provided with powerfully developed natatory appendages. The *Notodelphyoida*, on the other hand, are for whole their life confined to their hosts (simple and compound Accidians), all stages of growth being mostly found together in the branchial cavity of these Tunicata. Yet they do not seem, as a rule, to feed on the juices of their hosts, but more properly on the nourishing particles and small organisms introduced, together with the constantly renewed water, in the branchial cavity by the breathing process. Of course they cannot at all be regarded as true parasites, but more properly as commensals or messmates. Both divisions here treated of are well represented in the Fauna of Norway, and as there is some confusion in regard to the exact definition of the genera and species, and moreover the descriptions and figures given by earlier authors in many cases are very incomplete and partly erroneous, I think that a thorough revision of these 2 interesting groups, accompanied by good figures, cannot fail to be of interest.

MONSTRILLOIDA.

Remarks.—The most prominent morphological character distinguishing this group of Copepoda, is the total absence, in the adult state, of both the posterior antennæ and of any traces of oral appendages, as also of a functional alimentary canal. Of course the fully developed animal is quite incapable to feed in the ordinary manner, but may only subsist on the nourishing matter accumulated within the body-cavity during its juvenile parasitic existence, the adult stage being exclusively devoted to the propagation. The division *Monstrilloida* comprises as yet only a rather restricted number of forms, which all formerly were referred to a single genus, viz., *Monstrilla* of Dana, with which the genus *Thaumaleus* of Krøyer was considered to be identical. In recent times, it is true, a subdivision of the genus *Monstrilla* into 2 or 3 genera has been attempted, but these genera are so closely allied, that they at all events must be comprised within the same family. Yet an interesting new genus (*Thaumatopsyllus*), apparently referable to the *Monstrilloida*, has recently been added by the present author, and this genus is so very different from the other Monstrilloid genera, that it cannot by any means be included in the same family with them, but must be regarded as the type not only of a separate family, but even of a distinct section, for which I have proposed the name *Monstrilloida cyclopimorpha*. Of course the division Monstrilloida appears at present cleft into 2 well defined sections, the *M. cyclopimorpha* and the *M. genuina*; but each of these sections is as yet only represented by a single family.

Section 1.

Monstrilloida cyclopimorpha

Remarks.—The type of this section is the remarkable form described by the present author in another place under the name of *Thaumatopsyllus paradoxus*. The reception of this form within the division *Monstrilloida* appears to be warranted by the above-mentioned general morphological character: the total absence of both the posterior antennæ and of any oral appendages. Otherwise this form differs considerably from the Monstrilloid type.

Fam. Thaumatopsyllidæ.

Remarks.—As this family at present only comprises a single genus, it may be sufficient to give the characters of that genus.

Gen. *Thaumatopsyllus*, G. O. Sars, 1913.

Generic Characters.—Body of adult female cyclopoid in shape, the anterior division being conspicuously dilated, the posterior slender and attenuated. Head consolidated with the 1st trunkal segment, and having the front produced below to a short and blunt rostral prominence. The 2 succeeding trunk-segments normally developed, the 2 posterior ones, however, abruptly much narrower and firmly connected with the tail, to form with it the posterior movable portion of the body. Tail proper composed in female of only 3 segments, the last extremely slender and narrow, rod-like. Caudal rami well

developed, with the normal number of setæ, Anterior antennæ composed of a limited number of well defined joints, and extended laterally. No traces of posterior antennæ and oral appendages observable, nor of any distinct oral tubule. Three pairs only of natatory legs present, the 2 posterior pairs of legs being quite rudimentary and of similar structure. Two ovisacs present in female.

Remarks.—In the above diagnosis i have attempted to give the most essential characters, by which the present genus distinguishes itself from the other known Monstrilloida. The mutual relation of the 2 chief divisions of the body is very peculiar, and does not agree either with that mentioned by Giesbrecht as characteristic to his suborder *Gymnoplea* or with that characterising the *Podoplea*, the movable articulation between the 2 divisions occurring in quite a different place, viz., at the junction between the penultimate and anti-penultimate trunk-segments. This is indeed a quite unique character distinguishing this genus from any other form known to me. As anomalous characters may also here be named the presence of only 3 pairs of natatory legs, and the narrow rod-like shape of the last caudal segment. The genus comprises as yet only a single species, to be described below.

1. *Thaumatopsyllus paradoxus*, G. O. Sars.

(Pl. I.)

Thaumatopsyllus paradoxus, G. O. Sars, Arch. f. Mathem. og Naturvidenskab. Bd. XXXIII, No. 6, p. 5, w. plate.

Specific Characters.—*Female.* Body comparatively slender, with the anterior division somewhat depressed and oblong oval in outline. Cephalic segment very large and slightly contracted anteriorly, frontal part narrowly rounded. The 2 succeeding segments well developed, with the lateral parts closely contiguous and rounded behind. Penultimate trunk-segment scarcely more than half as broad as the preceding one; last segment still smaller. Tail exceedingly slender, almost attaining half the length of the body; genital segment slightly constricted in the middle; 2nd segment quite short and having the posterior edge somewhat produced dorsally; 3rd segment more than twice as long as the other 2 combined, and extremely narrow, rod-like, with the slightly dilated extremity transversely truncated. Caudal rami but slightly diverging and oblong quadrangular in form, being about 4 times as long as they are broad, and a little widening distally; seta of outer edge occurring about in the middle; apical setæ of moderate size and densely ciliated, the outermost one shorter than the other 3. Antennæ not nearly attaining the length of the cephalic

segment, and each composed of 9 joints clothed with scattered simple setæ; 3rd joint much the largest, the 6 outermost joints comparatively short and equal-sized. The 3 pairs of natatory legs normally developed and of essential same structure, with both rami 3-articulate and nearly of equal size. The last 2 pairs of legs very unlike the former, and reduced to simple small 3-articulate stems, with the middle joint very small, last rounded in shape and provided with 2 unequal apical spines. Ovisacs very large, rounded oval in form.

Body in the living animal highly transparent and nearly colourless, its anterior part being filled up with a number of clear oil-bubbles of unequal size and partly of a light orange colour. Eye replaced by a comparatively large transverse patch of a light red pigment, in which, however, no trace of refracting elements could be detected.

Length of adult female 1.65 mm.

Male unknown.

Remarks.—The above-described form is easily recognisable from any of the other known Copepoda, both as regards its outward appearance and the structure of the several appendages. I am much inclined to believe, that its life-history will turn out to be a similar one to that stated by Malaquin for the *Monstrillidæ*, and that in the juvenile state this form leads a true parasitic existence within the body of some invertebrate animals.

Occurrence.—Three specimens only of this remarkable form, all of the female sex, have as yet come under my notice. One of them was taken, many years ago, in the Christiania Fjord, at Drøbak, the other 2 in the Trondhjem Fjord, at Selven. All 3 specimens were captured, together with other pelagic animals, by the aid of a plankton-net lowered to a depth of about 60 fathoms. The living animal was seen moving through the water in a similar jumping manner to that observed in most Cyclopoida. It was, however, by no means particularly agile in its movements.

Section 2. **Monstrilloida genuina.**

Remarks.—In this section are comprised the typical Monstrilloida, the general characters of which coincide with those given below for the sole family as yet representing the section.

Fam. Monstrillidæ.

General Characters.—Body more or less slender and elongated, with the anterior division only slightly dilated and not sharply marked off from the posterior. Head and 1st trunkal segment completely coalesced, forming together a very large segment of a more or less cylindrical shape, and as a rule occupying rather more than half the body, its anterior extremity obtusely truncated, without any rostral prominence; ventral face of the segment in the greater extent of its length quite smooth, exhibiting no traces of either posterior antennæ or any oral appendages, being only provided in the median line with a small tubular process, from which a short canal leads to the inner substance of the body; the latter in female specimens retracted from the walls of the segment in a most peculiar manner, so as to form a rather narrow band-like chord passing through the axis of the segment. Exposed part of trunk composed of 4 well defined segments gradually diminishing in size behind. Tail poorly developed, with the number of segments more or less reduced, and exhibiting well marked sexual differences. Caudal rami, as a rule, short, but provided with strong plumose setæ, the number of which is somewhat variable in the

different genera. Eye, when present, exhibiting 3 highly refracting lenses, one ventral and 2 lateral, imbedded in a dark pigment. Anterior antennæ, unlike what is generally the case in Copepoda, extended straight forwards, and composed of a limited number of joints clothed with rather unequal setæ pointing in different directions, some of them being much elongated and finely ciliated, some others, attached to the terminal joint, exhibiting not seldom a peculiar dichotomous ramification; same antennæ in male distinctly hinged. Natatory legs present in the usual number, and very powerfully developed, with the basal part large and muscular and both rami 3-articulate. Last pair of legs in female represented on each side by a single more or less lamellar joint carrying a restricted number of plumose setæ; in male much reduced, or wholly absent. Alimentary canal quite obliterated. Ovaria, when fully developed, very massive, filling up the greater part of the body-cavity and extending anteriorly within the frontal part of the head; the ripe ova not included in any true ovisacs, but agglutinated to 2 slender juxtaposed spines or filaments issuing from the ventral face of the genital segment, these spines being in male replaced by a thickish, somewhat clavate appendage, into which the spermatophores are received before extrusion.

Remarks.—Of this family at first only 2 species were known, derived from 2 widely remote localities, the one recorded by Dana from the Sulu Sea as *Monstrilla viridis*, the other by Krøyer from the Norwegian coast as *Thaumaleus typicus*. These 2 species, though bearing very different names, are evidently nearly allied, and were also by most subsequent authors regarded as congeneric. In more recent times a considerable number of additional forms of the same remarkable type have been recorded from different parts of the oceans, and it appeared desirable to group these species according to some more conspicuous diversities found between them. Thereby the first step to a subdivision of the genus *Monstrilla* was intimated. Such a subdivision was indeed carried out in the year 1892 by Giesbrecht, who referred the Monstrillidæ at that time known to 2 nearly-allied genera, chiefly characterised by the segmentation of the tail and by the number of the caudal setæ. For the one of these genera he retained the old name *Monstrilla*, for the other he applied the name *Thaumaleus* proposed by Krøyer, and this arrangement has now generally been admitted by carcinologists. I am also of opinion that these 2 genera should be supported; but I am by no means prepared to consent with Giesbrecht in his application of the name *Thaumaleus* to the one of these genera. For it is quite certain, that the form recorded by Krøyer is not referable to Giesbrecht's genus, differing as it does,

just in one of the 2 principal characters by which that genus is distinguished from *Monstrilla*, viz., in the number of caudal setæ. Both according to the description given by Krøyer in "Naturhistorisk Tidsskrift" and to the figures in the Atlas to Gaimards voyage, the caudal rami in Krøyers species are each provided with 5 well-developed setæ, as in most species of the genus *Monstrilla*, whereas in Giesbrecht's genus the number of setæ is much reduced, only 3 such setæ occurring on each ramus (at last in female). In any case, if it should be found advisable to support the genus *Thaumaleus* of Krøyer, it must be confined to the species recorded by that author. Fortunately we have another generic name to replace that given by Giesbrecht to his genus, viz., *Cymbasoma*, proposed as early as the year 1888 by I. C. Thompson for a species (*rigidum*), which evidently is referable to Giesbrecht's genus. The genus *Hæmocera* of Malaquin I regard as synonymous with that genus. In addition to the 2 genera *Monstrilla* and *Cymbasoma*, I have found it advisable to establish another genus, *Monstrillopsis*, to include the anomalous species described by Scott under the name of *Monstrilla dubia*. The family Monstrillidæ thus at present comprises 3 genera, all of which are represented in the fauna of Norway.

Though I have not myself as yet had any opportunity to study the peculiar life-history of the Monstrillidæ, I think that a short resumé of the interesting investigations made in this respect by the French naturalist Malaquin¹⁾ may here be given. According to that distinguished author, the young live the eggs as small Nauplii, without mouth or alimentary canal, but provided in front with the usual 2 pairs of limbs (anterior and posterior antennæ) and behind them on each side with a hook-like appendage (mandibles). The Nauplii soon attach themselves to some polychæte Annelid and penetrate through the body-wall of the same, then entering the vascular system. By this process they lose completely all their appendages, and become converted to simple ovoid bodies merely consisting of an assemblage of indifferent embryonic cells surrounded by a thin cuticle. From the one end of these bodies 2 soft horn-like processes grow out, gradually increasing in length, and at last assuming the form of slender thread-like appendages. It is supposed that through these appendages the absorption of the blood-serum of the host is performed, and according to their position they may answer to the posterior antennæ. During the rapid growth of these endo-parasitic larvæ a remarkable differentiation takes place in their interior, resulting in the formation of the characteristic and rather

¹⁾. See: Arch. Zool. Exp. (3), Vol. 9, 1901.

complicated body of a true Monstrillid. In the last larval stage the enclosed Monstrillid is very distinctly traced through the thin outer cuticle of the larva, filling up nearly the whole inner cavity, and exhibiting all the definitive appendages, as also distinct traces of the generative organs, at least the female ones. At this time the larva is ready to force its way out of the body of the host, and this is apparently accomplished by a burrowing action of the hind acutely produced extremity, which is surrounded with several rows of small hooklike spinules. After the escape of the larva its thin outer cuticle soon burst, and the enclosed Monstrillid is thus allowed to emerge, unfolding its several appendages. Its movements are at first rather slow, but very soon, by a single moult, it acquires its full development, moving quickly about, to commence its free pelagic existence.

Gen. 2. *Monstrilla*, Dana, 1848.

Syn: ? *Thaumaleus*, Kröyer (not Giesbrecht).

Generic Characters.—Body as a rule very slender and elongated, especially in female, with the cephalic segment in most cases occupying rather more than half its length and more or less cylindrical in shape; exposed part of trunk gradually narrowed behind, with the lateral parts of the segments rounded off. Tail composed in female of 3, in male of 4 well defined segments, the last one rather small and obtusely truncated behind." Caudal rami sublamellar, each provided in female with 5 or 6 setæ, one of which is generally shorter than the others and attached more dorsally; those in male of same appearance as in female, but lacking one of the setæ. Eye in most of the species imperfectly developed. Oral tubule generally far remote from the frontal part of the head. Antennæ more or less elongated, with the joints generally imperfectly defined in female. Natatory legs with the basal part very massiv, rami comparatively short, both clothed inside and at the end with long plumose setæ; outer ramus somewhat longer than the inner and only provided with 2 small spines outside, the one attached to the 1st joint, the other to the end of the last joint. Last pair of legs in female sublamellar and somewhat extended laterally, inner edge more or less expanded, extremity slightly exserted and provided with 3 (in some cases only 2) plumose setæ; those in male much reduced in size, knob-like, and tipped with one or two slender setæ.

Remarks.—The present genus was established as early as in the year 1848 by Dana, and may be regarded as the type not only of the family Monstrillidæ, but also of the whole division here treated of. It is chiefly distin-

guished from the other 2 genera comprised within the present family by the more complete segmentation of the tail and the increased number of caudal setæ. Another character by which the species of this genus may be readily recognised, is the position of the oral tubule, which is more or less far remote from the frontal part of the head, whereas in the other 2 genera it generally occurs in close approximation to that part.

Seven Norwegian species referable to this genus will be described in the sequel, one of them being, however, somewhat doubtful and only observed in the male sex.

2. *Monstrilla longicornis*, Thompson.

(Pl. II & III).

Monstrilla longicornis, I. C. Thompson, Trans. Biol. Soc. Liverpool, Vol IV, p. 119, Pl. IV, figs. 1, 2, 4 (♂).

Syn: *Monstrilla intermedia*, Aurivillius.

Specific Characters.—*Female.* Body moderately slender, with rather coarse integuments, which exhibit everywhere a finely granular or dotted surface. Cephalic segment occupying about half the length of the body, and almost of equal width throughout, though, seen dorsally, exhibiting somewhat behind the middle a slight but easily observable dilatation, frontal part bluntly truncated. Tail about equalling half the length of the exposed part of the trunk; genital segment comparatively large, being fully as long as the remaining part of the tail, and oblong quadrangular in shape, with a well marked transverse suture in the middle of the dorsal face; ovigerous spines about twice the length of the tail. Caudal rami about equalling in length the last 2 segments combined, and only slightly divergent, each provided with 5 strong plumose setæ of nearly equal size, the outermost one attached to a well-marked ledge of the outer edge, the others to the somewhat obliquely rounded apex. Eye imperfectly developed, without any trace of refracting elements, and only replaced by a diffuse yellowish pigment. Antennæ rather slender and elongated, though scarcely exceeding in length the cephalic segment, and each apparently composed of 5 joints, of which, however, only the 1st is distinctly defined, the others being confluent and only indicated by slight constrictions of the antenna; most of the setæ attached around the middle of the fusiform terminal joint reachably ramified. Oral tubule well marked and occurring somewhat behind the middle of the cephalic segment. Natatory legs all of the very same structure and also of about equal size; 2nd basal segment not very sharply defined from the 1st, and armed inside with 2 small juxtaposed denticles; terminal joint of outer

ramus rather produced, being fully twice as long as the middle one, and having the outer edge divided into 4 very distinctly marked crenulations. Last pair of legs rather broad at the base, but having the outer part abruptly narrowed and provided at the obtusely rounded extremity with 3 ciliated setæ, the innermost of which is much smaller than the other 2; inner expansion almost rectangular and carrying a single, but well developed seta.

Male considerably smaller than female and of somewhat shorter and stouter form of the body, but exhibiting a very similar shape of the cephalic segment. Tail comparatively more slender than in female, and composed of 4 well defined segments of nearly equal length, the 1st, as usual, produced below to a club-like copulative appendage terminating in 2 short diverging rami, each armed at the end with a short spine. Caudal rami of a similar shape to that in female, but with one of the apical setæ absent. Antennæ more strongly built than in female and having the joints more distinctly defined, being moreover conspicuously hinged, the hinge occurring between the last 2 joints. Natatory legs of exactly same structure as in female. Last pair of legs, however, much reduced in size, forming 2 small knob-like prominences issuing from a common base, each prominence tipped by 2 (in some cases only 1) slender setæ.

Body in both sexes of a yellowish grey colour, and on the whole less transparent than in most other species.

Length of adult female 3.50 mm., of male 2.30 mm.

Remarks.—This species was established in the year 1890 by J. C. Thompson, and was only based on a solitary male specimen taken by him off the Puffin Islands. Subsequently, however, Th. Scott recorded this form from many other localities, and has given in the report of the Fishery Board for Scotland (1904) good descriptions and figures of both sexes. He is of opinion that Giesbrecht's species, *M. longiremis*, is identical with that observed by him; but this is certainly not the case, as will be shown further on. The present species may be easily distinguished from its nearest allies by the somewhat robust body and the rather coarse and distinctly granular integuments. Two other characters, both derived from the structure of the natatory legs, may also here be named, viz., the presence inside the 2nd basal segment of 2 well defined denticles, and the very conspicuous crenulation of the outer edge on the terminal joint of the outer ramus. These characters are pretty constant and found quite alike in both sexes. The form recorded by Aurivillius under the name of *M. intermedia* is identical with the present species.

Occurrence.—I have met with this form occasionally in several places, both on the south and west coast of Norway, among other pelagic animals

taken by the aid of the tow-net near the surface of the sea. The movements of the animal are very rapid, and are performed in abrupt bounds, whereby the body is kept in a more or less erect position. Male specimens seem to occur in nearly same number as the females.

Distribution. British Isles (Thompson, Scott), Skagerak (Aurivillius).

3. *Monstrilla longiremis*, Giesbrecht.

(Pl. IV & V)

Monstrilla longiremis, Giesbrecht, Pelagische Copepoden des Golfes von Neapel, p. 589, Pl. 46, figs. 10, 14, 22, 37, 41.

Specific Characters.—*Female.* Body considerably more slender than in the preceding species, with thinner and scarcely at all granular integuments. Cephalic segment occupying rather more than half the length of the body, and slightly narrowed in its anterior part, with no distinct dilatation in the middle. Tail agreeing with that in *M. longicornis*, as regards its relativ size and its segmentation, but having the ovigerous spines considerably more elongate. Caudal rami comparatively narrower than in that species and remarkably divergent; number of marginal setæ, as in *M. longicornis*, 5 on each ramus, the innermost but one conspicuously shorter than the others. Eye inconspicuous. Antennæ exceedingly slender and elongated, considerably exceeding in length the cephalic segment, and, as in the preceding species, having all the joints, except the 1st, confluent. Oral tubule rather small, and occurring about in the middle of the cephalic segment. Natatory legs resembling in structure those in *M. longicornis*, but differing in the presence of only a single denticle inside the 2nd basal segment, and in the total absence of any crenulations on the outer edge of the terminal joint of the outer ramus. Last pair of legs comparatively narrower, with the inner expansion less prominent and evenly rounded off; number of marginal setæ as in *M. longicornis*. Ova attached to the genital spines very numerous, and in some cases accumulated to form an oblong oval mass extending far beyond the limits of the body.

Male of rather small size, as compared with the female, but exhibiting a much similar slender and narrow form of the body. Cephalic segment nearly perfectly cylindrical in shape and exceeding somewhat in length the remaining part of the body. Tail, as in the male of *M. longicornis*, distinctly 4-articulate, with the copulative appendage of a very similar structure. Caudal rami agreeing in shape with those in female and spread out in the same remarkable manner, each of them, however, only provided with 4 setæ. Antennæ much more slender than in the male of *M. longicornis*, with the 2nd joint of

unusual length, otherwise built in a much similar manner. Natatory legs exactly as in female. Last pair of legs, however, very small, knob-like, each only tipped with a single slender seta.

Body in both sexes rather pellucid with only a very slight yellow tinge, and provided in some places with a few small pigmentary patches of a darker colour.

Length of adult female generally about 3 mm., though in some instances reaching 3.70 mm.; that of male scarcely attaining 2 mm.

Remarks.—The above-described form is unquestionably the same as that recorded by Giesbrecht from the Mediterranean, the identity of both being at once seen by a comparison of the figures here given with those in Giesbrecht's work. It is true that the present form in several respects shows a near relationship to *M. longicornis*; but I think that the above given descriptions of these 2 forms will prove them to be in reality specifically distinct.

Occurrence.—Several specimens of this form have been taken by me at different times and in different places on the Norwegian coast, from the Christiania Fjord and northwards to Kvalø. Only a single male has, however, as yet come under my notice, all the other specimens were of the female sex.

Distribution.—Mediterranean (Giesbrecht).

4. *Monstrilla clavata*, G. O. Sars, n. sp.

(Pl. VI)

Specific Characters.—*Female.* Body rather stout and clumsy, being considerably dilated in its anterior part and viewed laterally, of a pronouncedly clavate shape. Cephalic segment very large, occupying rather more than half the length of the body, and having its greatest width about in the middle, dorsal face remarkably vaulted in front. Tail about half the length of the exposed part of the trunk, and on the whole resembling in structure that in the 2 preceding species; ovigerous spines rather produced, being fully 3 times as long as the tail. Caudal rami exceeding somewhat in length the last 2 segments combined, and only slightly divergent, each, as in the 2 preceding species, provided with 5 setæ, the innermost but one being, however, considerably shorter than the others. Eye inconspicuous. Antennæ not nearly attaining the length of the cephalic segment, otherwise built in much the same manner as in the 2 preceding species. Oral tubule rather prominent and occurring somewhat behind the middle of the cephalic segment. Natatory legs, as in *M. longiremis*, armed inside the 2nd basal segment with a single well-marked denticle, terminal joint of outer ramus with a slight indication of a crenulation

of the outer edge. Last pair of legs very similar in shape to those in *M. longicornis*, the inner expansion being rather prominent.

Body in the living animal whitish pellucid, and ornamented with irregular patches of a light reddish brown or chestnut-coloured pigment.

Length of adult female 4.50 mm.

Male unknown.

Remarks.—This is much the largest of the species observed by me, and I therefore at first believed it to be the *M. grandis* of Giesbrecht. On a closer examination I have, however, found it to differ in some respects very essentially from that species, being in reality much more nearly related to the 2 preceding species, though easily distinguishable from them by the rather different shape of the body.

Occurrence.—A solitary female specimen of this form was taken, many years ago, at Hvalør, outside the Christiania Fjord.

5. *Monstrilla leucopis*, G. O. Sars, n. sp.

(Pl. VII)

Specific Characters.—*Female.* Body exceedingly slender and elongated, resembling somewhat in shape that of *M. longiremis*. Cephalic segment considerably exceeding half the length of the body, and of a narrow cylindrical form. Tail comparatively short, scarcely attaining half the length of the exposed part of the trunk; genital segment rather dilated at the base, and without any trace of a dorsal suture; ovigerous spines of moderate length. Caudal rami rather large, exceeding in length the last 2 segments combined, and only slightly divergent, inner edge perfectly straight, outer considerably protuberant in front of the middle; each ramus provided with 5 setæ, 3 of which issue from the narrowly rounded apex, the other 2 from the outer edge, the latter of very unequal size, the proximal one being normally developed, whereas the distal one is greatly reduced, and only slightly exceeds in length the corresponding ramus. Eye inconspicuous, and replaced by an opaque whitish substance apparently answering to the ocular pigment. Antennæ rather slender, though not nearly attaining the length of the cephalic segment, and having their 5 joints more distinctly defined than in the preceding species, none of the setæ attached to the terminal joint ramified. Oral tubule rather small, and occurring somewhat in front of the middle of the cephalic segment. Natatory legs without any denticle inside the 2nd basal segment, outer ramus rather produced and having the outer edge of the terminal joint perfectly

smooth. Last pair of legs gradually narrowed distally, and only provided with 2 apical setæ, inner edge scarcely expanded.

Male much smaller than female, but exhibiting a very similar slender form of the body. Tail, as usual, composed of 4 well defined segments, the 1st of which is the largest, and is produced below to a rather large and prominent copulative appendage of an oblong oval form and armed on each side with a straight rod-like spine. Caudal rami of the very same shape as in the female, and having the outermost but one of the setæ reduced in a similar manner, differing, however, as in the males of the preceding species, in the absence of one of the apical setæ. Anterior antennæ hinged in the usual manner. Last pair of legs reduced to 2 very small knob-like prominences, each tipped with a single slender seta.

Body (in female) highly transparent and ornamented in some places with pigmentary patches of a light reddish colour. Length of adult female reaching to 3.30 mm.; that of male scarcely exceeding 1.60 mm.

Remarks.—I have been in some doubt, if not the above-described form should be the same as that recorded by Scott under the name of *M. anglica* Lubbock. Indeed, in the structure of the last pair of legs and the peculiar reduction of the outermost but one of the caudal setæ, both these forms seem to agree pretty well. On the other hand, is the general shape of the body, to judge from the figure given by Scott, rather unlike, and another very essential difference is found as regards the number of the caudal setæ, which, both according to the description and the figure given by Scott, is stated to be 6 on each ramus in the form observed by him. In any case the specific name *anglica* cannot be applied either to the present form, or to that observed by Scott, as it seems evident that Lubbock's species is different from both of them. I have retained for the species here treated of the name assigned to it long ago in my notes.

Occurrence.—Some few specimens of this form, among them a single male, were collected, many years ago, at Kvalø on the Nordland coast.

6. *Monstrilla gracilicauda*, Giesbrecht.

(Pl. VIII)

Monstrilla gracilicauda, Giesbrecht. Pelagische Copepoden des Golfes von Neapel, p. 587, Pl. 46, figs. 9, 16, 18, 29, 32, 43.

Specific Characters.—*Female.* Body moderately slender, with the anterior division slightly dilated in the middle. Cephalic segment about occupying half

the length of the body, and, viewed dorsally, exhibiting a very slight dilatation in front of the middle, frontal edge somewhat produced between the insertion of the antennæ. Tail exceeding half the length of the exposed part of the trunk; genital segment rather large, being considerably longer than the remaining part of the tail, and gradually narrowed behind, dorsal face with a very slight transverse suture in the middle; ovigerous spines unusually short. Caudal rami comparatively small and somewhat divergent, each provided with 6 setæ, one of which, however, is very short and attached somewhat dorsally. Eye easily observable in the living animal, though of a somewhat incomplete structure, lateral lenses small and rather remote from each other, being connected by a narrow stripe of dark pigment, ventral lens apparently imperfectly developed. Antennæ rather shorter than in the species described in the preceding pages, not even attaining half the length of the cephalic segment, and only composed of 4 joints, the last of which is about as long as the other 3 combined and somewhat fusiform in shape, with none of the setæ ramified. Oral tubule occurring unusually far in front, at about the end of the first $\frac{1}{3}$ of the cephalic segment. Natatory legs without any denticle inside the 2nd basal segment, outer ramus considerably longer than the inner and having the terminal joint well developed, with the outer edge perfectly smooth. Last pair of legs somewhat clavate in outline, the inner edge forming a rounded expansion immediately inside the extremity, apical setæ 3 in number and of nearly equal size.

Body in the living animal rather transparent and in some places tinged with a light yellow pigment.

Length of adult female reaching to 3.55 mm.

Male unknown.

Remarks.—The present species is easily distinguished from those described in the preceding pages by the comparatively shorter antennæ, the position of the oral tubule, and the shape of the last pair of legs. The tail, moreover, appears more elongate and the genital segment of larger size than in those species.

Occurrence.—Some few specimens of this form, all of the female sex, were collected, many years ago, in 2 different places on the Nordland coast, viz., Valdersund and Kvalø.

Distribution.—Mediterranean (Giesbrecht) Scottish coast (Scott).

7. *Monstrilla helgolandica*, Claus.

(Pl. IX)

Monstrilla helgolandica, Claus. Die freilebenden Copepoden, p. 165, Pl. 12, fig. 9.

Specific Characters.—*Female.* Body comparatively short and stout, and somewhat dilated in its anterior part. Cephalic segment about occupying half the length of the body and, viewed dorsally, exhibiting a somewhat fusiform shape, with the greatest width a little in front of the middle and almost attaining half the length. Tail of a similar shape to that in *M. gracilicauda*, the genital segment being rather large and gradually narrowed behind; ovigerous spines of moderate length. Caudal rami considerably divergent, and narrow oblong in shape, each provided with 6 setæ of somewhat unequal length, one of them, attached somewhat dorsally, being very small, that next to it on the outer side somewhat shorter than the 4 remaining ones, all the setæ issuing from the outermost rounded part of the ramus. Eye easily observable, and having all 3 lenses distinctly developed. Antennæ scarcely attaining half the length of the cephalic segment, and, as in *M. gracilicauda*, only composed of 4 joints. Oral tubule well marked, and occurring about in the middle of the cephalic segment. Natatory legs without any denticle inside the 2nd basal segment, outer ramus less elongate than in the other species, with the terminal joint of smaller size. Last pair of legs rather unlike those in the other known species, each forming a narrow cylindrical stem, angularly bent in the middle and tipped with 2 subequal setæ.

Body very transparent in its anterior part, but behind tinged with a dark brownish pigment.

Length of adult female scarcely exceeding 1.40 mm.

Male unknown.

Remarks.—This is a very small-sized species, and may moreover be easily recognised by the unusual short and stout form of the body, as also by the structure of the caudal rami and that of the last pair of legs. The form recorded by Bourne as *M. helgolandica* is quite certainly not that species, but more properly referable to *M. longiremis* Giesbrecht.

Occurrence.—Two female specimens only of this form have as yet come under my notice. They were taken, many years ago, at Christiansund, west coast of Norway.

Distribution.—Helgoland (Claus), Skagerak (Timm).

8. *Monstrilla serricornis*, G. O. Sars, n. sp.

(Pl. X, fig. 1).

Specific Characters.—*Male.* Body comparatively short and stout, and, seen laterally exhibiting a somewhat clavate shape. Cephalic segment shorter than usual, only slightly exceeding in length the exposed part of the trunk and, seen dorsally, nearly of equal width throughout, its ventral face forming anteriorly a rather prominent gibbous convexity, but without any distinctly marked oral tubule. Tail rather narrow, and composed of 4 well defined segments, the 1st of which is produced below to a sub-clavate copulative appendage provided at the end on each side with a short auriculiform lobe. Caudal rami comparatively small and somewhat divergent, each having the form of a rounded oval lamella edged with 5 subequal setæ. Eye inconspicuous. Antennæ about equalling in length $\frac{2}{3}$ of the cephalic segment, and rather strongly built, being composed of 5 well defined joints, the last of which is, as usual, very movably articulated to the preceding one, and somewhat knife-shaped, with the inner sharpened edge divided at the extremity into 5 small recurved denticles. Natatory legs of the usual structure. 5th pair of legs wholly absent.

Colour not yet ascertained. Length of the body 1.75 mm.

Female unknown

Remarks.—It is only provisionally that I refer the above-described remarkable form to the genus *Monstrilla*, from which it in some respects seems to differ rather conspicuously. As, however, only the one sex as yet has been observed, its true relationship cannot at present be fully made out. The peculiar armature of the antennæ may suffice to distinguish at once this form from any of the hitherto known *Monstrillidæ*.

Occurrence.—Two specimens only of the present form have as yet come under my notice, both of the male sex and exactly agreeing with each other. The one was taken at Bukken, outside the Stavanger Fjord, the other at Kvalø, on the Nordland coast.

Gen. 3. *Cymbasoma*, Thompson, 1888.

Syn: *Thamaleus*, Giesbrecht (not Krøyer).

• *Hæmocera*, Malaquin.

Generic Characters.—General form of the body resembling that in *Monstrilla*. Tail however having the number of segments reduced in both sexes, only 2 segments being present in female and 3 in male. Caudal rami com-

paratively short and more or less pronouncedly club-shaped, each ramus provided in female with only 3 distinctly developed setæ, whereas in male, contrary to what is the case in *Monstrilla*, their number is generally increased by one additional seta. Eye as a rule well developed. Antennæ rather short in female and only composed of 4 joints, in male much more elongate, and distinctly 5-articulate, with a well-marked hinge between the last 2 joints. Oral tubule generally occurring far in front, in close approximation to the frontal part of the head. Natatory legs built in the usual manner. Last pair of legs in female comparatively short, but provided inside with a well defined lobe; in male wholly absent.

Remarks.—This genus was proposed in the year 1888 by J. C. Thompson, to include a peculiar Copepod (*C. rigidum*), of which at first only a single female specimen was found. As, on a closer examination of several other specimens taken by the same author partly in the Mediterranean, partly on the British coast, the near relationship of this form to the species at that time referred to the genus *Monstrilla* of Dana was recognised, the generic name *Cymbasoma* was subsequently withdrawn in favour of that of *Monstrilla*. By the subdivision of the latter genus into 2 nearly-allied genera carried out by Giesbrecht, it was, however, of course required to decide to which of these 2 genera the species of Thompson should be referred, and in this regard no doubt can arise. It is quite certainly a true member of the genus to which Giesbrecht had applied the name *Thaumaleus*. Since, however, as stated above, the application of this name to the present genus is quite inadmissibel, I have felt justified to restore the generic name proposed by Thompson.

The genus here treated of is chiefly distinguished from *Monstrilla* by the reduced number of segments in the tail, and, by the likewise reduced number of caudal setæ. Moreover the position of the oral tubule and the total absence in the male of the 5th pair of legs may be named as characters distinguishing the present genus. Three well defined species with be described in the succeeding pages.

9. *Cymbasoma rigidum*, Thompson.

(Pl. X, fig. 2, Pl. XI).

Cymbasoma rigida, J. C. Thompson, Linn. Soc. Journ. Zool., Vol., XX, p. 154, Pl. XIII, figs. 1—4.

- Syn: *Monstrilla rigida*, Bourne.
 „ *Thaumaleus rigidus*, Scott.
 „ *Thaumaleus Claparèdi*, Giesbrecht.
 „ *Thaumaleus germanicus*, Timm.
 „ *Hamocera Danæ*, Malaquin.

Specific Characters.—*Female.* Body moderately slender, and generally extended in a manner to give it a somewhat rigid appearance. Cephalic segment fully as long as the remaining part of the body and, viewed dorsally, somewhat dilated in the middle, ventral face evenly convex throughout. Tail scarcely exceeding half the length of the exposed part of the trunk; genital segment of moderate size and evenly narrowed behind, ovigerous spines nearly 3 times as long as the tail; distal segment somewhat flattened and gradually widening behind, exhibiting in front of the middle, on each side, a slight notch, as an attempt to a subdivision, the notch not being, however, continued in any defining suture. Caudal rami only slightly longer than they are broad, and not much divergent, with the inner edge somewhat concaved, the outer gibbously produced, each ramus provided with 3 strong subequal setæ, the outermost of which is attached to a rather prominent ledge; a very small appendicular bristle is moreover generally found attached near the inner corner to the ventral face. Eye well developed, with all 3 lenses distinct. Antennæ rather short, scarcely attaining $\frac{1}{3}$ of the length of the cephalic segment, terminal joint somewhat shorter than the other 3 combined, with none of the setæ ramified. Oral tubule rather small, and occurring at about the end of the first $\frac{1}{4}$ of the cephalic segment. Natatory legs with the outer ramus only slightly longer than the inner, its terminal joint not much produced. Last pair of legs with 3 apical setæ, the innermost of which is much smaller than the other 2, inner edge produced to a narrow linguiform lobe curving outwards along the terminal part of the leg, and in most cases extending as far as the latter. Ova attached to the genital filaments very numerous and in some cases accumulated to form an elongate almost cylindrical mass extending far beyond the limits of the body.

Male, as usual, smaller than female and of a shorter and more robust form of the body, with the cephalic segment somewhat clavate in outline. Tail rather narrow and composed of 3 segments, the last exhibiting on each

side a quite similar notch to that observed in female; copulative appendage divided at the end into 2 comparatively large diverging lobes of a somewhat sausage-shaped form. Caudal rami more pronouncedly clavate than in female, each provided with 4 slender subequal setæ attached to the obtusely truncated and distinctly thickened extremity, one of them apparently answering to the small appendicular bristle found in the female. Antennæ much more elongate than in female and distinctly 5-articulate, last joint very movably articulated to the preceding one, and terminating in a slender, slightly curved spine. Natatory legs of exactly same structure as in female. Of a 5th pair of legs not the slightest trace is to be detected.

Body of female, as usual, very transparent in its anterior part, but otherwise exhibiting a light yellowish-grey colour, and tinged in some places with a darker brownish pigment.

Length of adult female reaching to 2.50 mm., of male to 1.75 mm.

Remarks.—That the present form is identical with that recorded by I. C. Thompson under the name of *Cymbasoma rigidum* and subsequently more fully described by Scott as *Thaumaleus rigidus*, appears to me to be beyond any doubt, and I am also of opinion, that several other forms, described under different names, should be referred to that species. Indeed, I have been unable to find any reliable character to distinguish the several forms enumerated above as synonymes, and I am thus led to the conclusion, that they all should be combined into the very same species, for which of course the earliest name ought to be retained.

Occurrence.—Several specimens of this form have been taken by me at different times and in different places, both on the south and west coast of Norway. Most of the specimens collected were of the female sex; but I have also come across a few male specimens, one of which has been subjected to a closer examination and is figured on Pl. X.

Distribution.—Atlantic Ocean off Teneriffe (Thompson). Mediterranean (Giesbrecht), coast of Normandie (Claparède), British Isles (Thompson, Scott), Eastern part of North Sea (Timm).

10. *Cymbasoma Thompsoni*, (Giesbrecht).

(Pl. XII)

Thaumaleus Thompsoni, Giesbrecht, Pelagische Copepoden des Golfes von Neapel, p. 584,
Pl. 46, figs. 7, 27, 31, 36, 40.

Syn. *Monstrilla* *Danæ*, Moebius (non Claparède)

Specific Characters.—*Female.* Body comparatively more slender than in the preceding species, with the cephalic segment narrower and considerably exceeding in length the remaining part. Tail very short, scarcely longer than the last 2 trunkal segments combined; genital segment unusually tumid, seen dorsally almost circular in outline, ventral face strongly protuberant, ovigerous spines of moderate length; distal segment without any traces of lateral notches. Caudal rami rather small, each provided with 3 subequal setæ; no appedicular bristle present. Eye apparently well developed. Antennæ scarcely attaining $\frac{1}{3}$ of the length of the cephalic segment, and of a structure very similar to that in the preceding species. Oral tubule somewhat more approximate to the frontal part of the head. Natatory legs with the outer ramus considerably longer than the inner, and the terminal joint more produced than in the preceding species. Last pair of legs resembling in structure those in *C. rigidum*, though having the innermost of the apical setæ rather smaller and the lobe of the inner edge less prominent.

Male comparatively more slender than that of the preceding species, and having the cephalic segment shorter and less pronouncedly clavate in shape. Tail composed of 3 well defined segments, the last of which, as in female, does not exhibit any traces of lateral notches. Caudal rami of the very same structure as in the female, each ramus being only provided with 3 setæ. Antennæ very strongly built, with the joints rather expanded, the last one very mobile and somewhat thickened at the extremity, which is armed with 2 small denticles. No traces of a 5th pair of legs present. Copulative appendage comparatively smaller than in the preceding species, with the terminal lobes less produced.

Colour of the living animal not yet ascertained.

Length of adult female 1.20 mm., of male 0.80 mm.

Remarks.—The present species was described by Giesbrecht from some specimens taken in the Baltic, east of Langeland, and sent to him from Moebius, who had previously recorded this form under the name of *Monstrilla* *Danæ*, Claparède. It may easily be distinguished from the preceding species by its much inferior size, and more particularly by the rather different shape

of the tail. The form described by Scott as *Thaumaleus Thompsoni* is quite certainly different from Giesbrecht's species.

Occurrence.—Three specimens only of this species, 2 females and 1 male, have as yet come under my notice. They were taken in as many different localities, viz., Christiansund, Skutesnæs and Risør.

Distribution.—Western part of the Baltic (Moebius).

11. *Cymbasoma longispinosum* (Bourne).

(Pl. XIII)

Monstrilla longispinosa, Bourne, Quart. Journ. Micr. Science, (2), Vol. 30, p. 575, Pl. 37, figs. 1—4, 10.

Syn: *Thaumaleus longispinosus*, Giesbrecht.

Specific Characters.—*Female*. Body rather slender, with the cephalic segment only very slightly dilated in the middle, and considerably exceeding half the length of the body. Tail very short, not even attaining the length of the 2 preceding segments combined; genital segment about the size of the last trunkal segment and, seen from above, of a very similar subquadrate form its ventral face considerably protuberant; ovigerous spines of quite an extraordinary length, attaining in some instances nearly the double length of the body, and confluent at the base for some distance; distal segment much narrower than the proximal one, being conspicuously constricted at the base, and without any trace of a subdivision. Caudal rami very small, scarcely longer than they are broad, and each only provided with 3 thickish setæ of equal length. Eye well developed, at least in female. Antennæ comparatively short and stout, scarcely exceeding in length $\frac{1}{4}$ of the cephalic segment and, as in the other species of the present genus, only composed of 4 joints, the last of which is about the length of the other 3 combined and gradually narrowed distally, some of its setæ distinctly ramified. Oral tubule occurring far in front, at only at short distance from the frontal part of the head. Natatory legs with the terminal joint of the outer ramus unusually short, scarcely longer than the middle one, and of a rounded form. Last pair of legs provided at the obtusely truncated extremity with 3 plumose setæ, the innermost of which is a little shorter than the other 2; inner lobe well defined, triangular, and extending at right angle to the axis of the leg.

Male somewhat smaller than female and less slender of form, with the cephalic segment comparatively shorter and nearly of equal width throughout. Tail exceeding somewhat half the length of the exposed part of the trunk, and composed of 3 well defined segments, the middle of which is the smallest;

copulative appendage divided at the end into 2 comparatively short diverging lobes. Caudal rami of a similar shape to those in the female, but each provided with 4, instead of 3, setæ of nearly equal length. Antennæ comparatively much larger than in female, and each composed of 5 well defined joints, the 3 middle ones lamellarly expanded inside and armed with several short spines in addition to the setæ, last joint comparatively small, but very movably articulated to the preceding one. Natatory legs agreeing exactly in structure with those in female. 5th pair of legs wholly absent.

Body, as usual, much more transparent in female than in male, being in the latter, according to Giesbrecht, everywhere of a dark fuscous colour.

Length of adult female 2.60—3.16 mm., of male 2.30 mm.

Remarks.—The present form is chiefly characterised by the extraordinary length of the ovigerous spines in the female and their peculiar coalescence at the base. In its general appearance it bears a very close resemblance to the form recorded by Claparède under the name of *Monstrilla danæ*, and, were it not that no mention has been made by that author on the above-named distinguishing character, I should indeed have been much inclined to regard these 2 forms as identical.

Occurrence.—The present species, it is true, has not yet been observed off the Norwegian coast; but I regard it as very probable that on further investigations it will be found to occur in some place or other on the south and west coast. As I have had an opportunity of examining this form, I find it advisable to give here a detailed description of it, for comparison with the other 2 species. The figures given on Pl. XIII have been drawn from specimens collected during one of the Monaco-Expeditions in the Mediterranean off Sardinia.

Distribution.—British Channel (Bourne), Mediterranean at Naples (Giesbrecht).

Gen. 4. *Monstrillopsis*, G. O. Sars, n.

Generic Characters.—Body of very different appearance in the 2 sexes, being exceedingly slender in female, much shorter and stouter in male. Tail composed in female of 3 well defined segments, the middle of which is the smallest, in male distinctly 4-articulate. Caudal rami in both sexes of the very same structure, being unusually produced, and each provided with 4 well

developed setæ, 2 apical and 2 lateral. Eye very fully developed, especially in male. Antennæ in female 4-articulate, in male much larger and distinctly 5-articulate, with the usual hinge between the last 2 joints. Oral tubule occurring far in front. Natatory legs built in the usual manner. Last pair of legs, however, in female of rather a peculiar structure, being somewhat fusi-form in shape, and each produced into 2 smooth conical lappets, the outer of which is the more prominent; setæ of these legs not, as usual, attached to the terminal edge of the leg, but arranged in a line crossing the base of the outer lappet. Male without any trace of these legs, but having the copulative appendage normally developed.

Remarks.—This new genus is established to include the anomalous form recorded by Scott under the name of *Monstrilla dubia*. Indeed, I have found it impossible to place this species either in the genus *Monstrilla* or in that of *Cymbasoma*, as it in some respects seems to combine characters of both these genera, in other respects to differ conspicuously from either of them.

12. *Monstrillopsis dubia*, (Scott).

Pl. XIV.

Monstrilla dubia, T. Scott, Twenty-second Ann. Rep. of the Fishery Board for Scotland, Part III, p. 247, Pl. XIII, fig. 14, Pl. XIV, figs. 16—18

Specific Characters.—*Female.* Body exceedingly slender and narrow, with the anterior division not at all dilated. Cephalic segment exceeding the remaining part of the body by $\frac{1}{3}$ of its length, and narrow cylindrical in form, being almost of equal width throughout. Tail about equalling half the length of the exposed part of the trunk; genital segment a little longer than the other 2 segments combined and slightly dilated at the base, with the ventral face somewhat protuberant; ovigerous spines of moderate length; anal segment somewhat flattened and sharply defined from the rather small middle segment. Caudal rami rather produced, exceeding somewhat in length the 2 preceding segments combined, and slightly divergent, each ramus provided with 4 setæ, one about in the middle of the outer edge, 2 at the apex, and one inside at some distance from the end. Eye very conspicuous in the living animal, with dark pigment and all 3 lenses well developed. Antennæ exceeding somewhat in length $\frac{1}{3}$ of the cephalic segment, and composed of 4 well defined joints, the last of which is fully as long as the other 3 combined; none of the setæ ramified. Oral tubule well marked, and occurring near the frontal part of the head. Natatory legs with the outer ramus con-

siderably longer than the inner, and having the terminal joint well developed. Last pair of legs rather narrow at the base, but considerably widening towards the end, which is produced to a conical lappet, across the base of which 3 slender setæ are attached; inner edge of the leg produced to a similar lappet, which, however, is quite smooth.

Male very unlike the female and of much smaller size, with the body much shorter and stouter. Cephalic segment somewhat club-shaped, and scarcely exceeding half the length of the body. Tail very narrow and composed of 4 well defined segments, the 1st of which is produced below to a rather large copulative appendage divided at the end into 2 diverging sub-cylindrical rami. Caudal rami of much the same appearance as in female, with the same number of setæ. Eye still more largely developed than in female, with the ventral lens rather prominent and highly refractive. Antennæ considerably exceeding half the length of the cephalic segment and distinctly 5-articulate, with the last very mobile joint abruptly attenuated distally.

Body in the living animal rather pellucid, with a pale yellow hue, and in some places dotted with a chestnut-coloured pigment.

Length of adult female 3.80 mm., of male 2.10 mm.

Remarks.—This form was described in the year 1904 by Scott from some female specimens taken in 2 different places of the Scottish coast. The resemblance of this form to *Monstrilla Danæ* Claparède, vindicated by Scott in a note to his description, I find to be a very slight one. In fact the present form is easily distinguishable both from this and from any other of the Monstrillidæ.

Occurrence.—Two specimens only of this remarkable form, a female and a male, have as yet come under my notice. They were captured, many years ago, at Bejan, outside the Trondhjem Fjord, and coloured drawings of both, when still alive, were immediately executed.

Distribution.—Scottish coast (Scott).

NOTODELPHYOIDA.

Remarks.—This division comprises a number of Copepoda, which partly differ considerably from each other and according to their organisation, represent several distinct types. Yet, all these forms agree as to habits, in so far that they live as parasites, or more properly as commensales, within Ascidians of different kinds. They were all by earlier authors comprised within a single family, the *Ascidicolidæ*, and this family was by Giesbrecht, together with the *Monstrillidæ* and several other heterogeneous groups, included in the 2nd tribe of his suborder *Podoplea*, for which the name *Ampharthrandria* was proposed. I have already mentioned, that the latter name is quite inapplicable for the present group of Copepoda, which comprises both forms with the anterior antennæ in the male transformed to prehensile organs, and such in which these antennæ are quite alike in the 2 sexes. According to the classification proposed by Giesbrecht, these latter forms should of course be transferred to his 1st tribe, the *Isokerandria*; but such a transfer appears quite unreasonable, since there are forms, otherwise closely related and even referred to one and the same genus, in which the above-named difference, as to the structure of the anterior antennæ, is found. Thus in the male of *Doropygus longicauda* Aurivillius, as will be shown farther on, these antennæ are very distinctly hinged, whereas in the other species referred to that genus they are quite alike in the 2 sexes. It is thereby clearly proved that the above-named character, upon which Giesbrecht laid so much stress, is of far inferior systematic value than opined by that author, and that it in reality must be considered unserviceable as the basis for a more general classification of the Copepoda. There are many other much more important diversities to be found on a comparison of the several forms comprised within the present group, and these diversities are in fact of such an essential quality as to make it inadmissible to include all these forms within a single family. This was also recognised by Thorell, who referred the forms observed by him to 3 different families, viz., *Notodelphyidæ*, *Ascidicolidæ* and *Buproridæ*. The 1st of these families has subsequently been subdivided by Prof. Brady into 2 nearly-allied

families: *Notodelphyidæ* (proper) and *Doropygidæ*, and 2 other very distinct families, *Botryllophilidæ* and *Enterocolidæ*, are here added. The present division thus comprises at least 6 families, and I regard it as very probable, that their number will still be augmented, on a closer investigation of the many peculiar forms found by Hesse within compound Accidians, but rather imperfectly described by that author.

Fam. 1. *Notodelphyidæ*.

General Characters.—Body in both sexes cyclopoid in shape and more or less straight, with the anterior division somewhat depressed, the posterior much narrower and cylindric in form. Exposed part of trunk composed in male of the usual number of segments, whereas in female the last 2 segments are confluent, forming together a large median piece somewhat broader in front than behind in young specimens, but in the adult female greatly expanded behind, to form dorsally a very voluminous, somewhat flattened bag or incubatory pouch, into which the ripe ova are received. Tail composed in both sexes of 5 segments not very different in size. Caudal rami well developed and provided at the end with strong ciliated setæ present in the usual number. Eye of the structure generally met with in the Copepoda. Anterior antennæ of moderate size, and extended laterally, being composed of numerous short joints densely clothed with setæ; those in male distinctly hinged. Posterior antennæ much smaller than the anterior, but distinctly prehensile, each terminating in a strong mobile claw. Oral parts, as a rule, well developed, and built on a somewhat similar type to that in the family *Cyclopinidæ*. The 4 anterior pairs of legs likewise cyclopoid in structure, and adapted for swimming; 5th pair of legs extremely small and rudimentary, biarticulate.

Remarks.—This family is here taken in a much more restricted sense than done by Thorell, who included into it also his 2 genera *Doropygus* and *Botachus*. In the restriction here adopted, the family only comprises 2 genera, viz., *Notodelphys* Allman and *Agnathaner* Canu.

Gen. 1. *Notodelphys*, Allman, 1847.

Generic Characters.—Body more or less elongated, and in female conspicuously dilated in the middle on account of the greatly expanded matrical part; integuments rather soft and flexible. Cephalic segment not very large, and produced in front to an obtuse deflexed rostral prominence. The 2 succeeding segments in both sexes well defined and separated by deep lateral incisions. Incubatory pouch in female broad, flattened, more or less advancing over the base of the tail. The latter perfectly cylindrical in form, with the 1st segment in female scarcely larger than the succeeding ones, in male somewhat swollen and generally containing 2 oval spermatophores. Caudal rami, as a rule, finely ciliated on both edges, and each carrying at the tip 4 well developed and somewhat diverging plumose setæ, being moreover provided with 2 small bristles, the one attached to the outer edge, the other to the dorsal face, near the inner corner. Eye comparatively small, but easily observable in the living animal, being provided with 2 lateral lenses imbedded in a bright red pigment. Anterior antennæ in female gradually tapered distally, and generally composed of 15 joints clothed with comparatively short, but distinctly ciliated setæ; those in male having the number of joints somewhat reduced, and exhibiting between the penultimate and antipenultimate joints a well marked hinge. Posterior antennæ only composed of 3 distinctly defined joints, the first 2, representing the basal part, somewhat compressed and separated by an oblique suture, at the end of which outside 2 juxtaposed plumose setæ are attached; terminal joint very movably articulated to the basal part, and linear in form; apical claw accompanied by a number of short curved setæ. Anterior lip projecting at the end into 2 triangular lappets. Mandibles with the masticatory part lamellarly expanded and divided at the end into several unequal teeth; palp well developed, biramous. Maxillæ with all their constituent parts distinctly defined. Anterior maxillipeds with the 1st basal joint very large and massive, exhibiting inside 3 or 4 short setiferous lobes; 2nd basal joint much narrower, and armed at the end inside with a strong claw-like spine accompanied by a slender seta; terminal part thin, 3-articulate. Posterior maxillipeds much smaller than the anterior ones, and 3-articulate, 1st joint much the largest and provided inside with several short plumose setæ arranged in 2 groups, each of the other 2 joints armed with a slender incurved spine, that of the terminal joint accompanied by 2 small setæ. Natatory legs with the basal part broad and flattened, rami in all the pairs

distinctly 3-articulate and armed in the usual manner, those of 1st pair somewhat unequal, in the other pairs of about equal size. Last pair of legs extremely small, and in female quite concealed beneath the dilated matrical part of the body; proximal joint short and broad, and produced outside to a digitiform process tipped with a small bristle; distal joint more or less scale-like, with a small apical bristle and a short spine inside.

Remarks.—This genus was established as early as in the year 1847 by Allman, and may be regarded as the type, not only of the present family, but of the whole division *Notodelphyoida*. It comprises the most perfectly organised forms of that division, and exhibits some unmistakable relations to certain gnathostomous Cyclopoida, in particular the *Cyclopinidæ*. Indeed, the forms included in the present genus may be regarded as Cyclopoids, which by a close adaptation to the particular conditions of life as commensales of Ascidians, have acquired some extraneous characters apparently distinguishing them very essentially from their original ancestors. The genus was in the year 1859 subjected by Thorell to a careful investigation, and its general characters were made out by him in a very satisfactory manner. Thorell distinguished within the genus no less than 7 different species, all of which I have had an opportunity of examining from material collected off the Norwegian coast. These species are very closely related to each others, and as the distinctive characters given by Thorell in the short diagnoses in Latin, preceding the description of each species, appeared to be of a rather trifling kind, the validity of most of them has been questioned by recent authors. On a careful examination I have, however, come to the conclusion, that they all ought to be supported, though their distinction indeed is attended with no small difficulties, at least in the case of preserved specimens. I hope that the descriptions given below, in connection with the figures on the accompanying plates, may render the species more easily recognisable than this has been possible by consulting the work of Thorell.

1. *Notodelphys Allmani*, Thorell.

(Pl. XV & XVI)

Notodelphys Allmanni, Thorell. Bidrag til kännedommen om Krustaceer som lefva i Arter af släktet Ascidia, p. 31, Pl. I, Pl. II. 1.

Syn: *Notodelphys mediterranea*, Buchholtz.

Specific Characters.—*Female.* Body moderately slender, with the anterior division pronouncedly depressed, and nearly twice as long as the posterior. Cephalic segment scarcely longer than the 2 succeeding segments combined,

and gradually narrowed anteriorly, terminating in an obtuse point. Incubatory pouch, when fully developed, very broad, rounded quadrate in outline, with the posterior edge slightly concave in the middle. Caudal rami rather slender, sublinear in form, and more or less divergent, attaining nearly twice the length of the anal segment, and more than 4 times as long as they are broad, both edges distinctly ciliated; apical setæ of moderate length and rather divergent; bristle of outer edge occurring at a distance from the end equalling about $\frac{1}{3}$ of the length of the ramus. Anterior antennæ nearly as long as the cephalic segment and rather thick at the base, but rapidly tapered distally, 3rd joint the largest, the 3 succeeding joints gradually diminishing in size, remaining joints very small; setæ attached to the anterior face of these antennæ rather coarse and very distinctly ciliated. Posterior antennæ moderately slender, with the terminal joint about the length of the other 2 combined. 1st pair of legs, as in the other species, differing from the succeeding ones by the presence, at the inner corner of the 2nd basal segment, of a short deflexed spine; rami moreover rather unequal, the outer one being considerably shorter than the inner and bent outwards in a peculiar manner, its 1st joint comparatively large and having the outer edge finely denticulate. Last pair of legs with the proximal joint rather broad and finely denticulate at the inner rounded corner, digitiform process considerably produced; distal joint small, scale-like and conspicuously contracted at the base, spine of inner edge accompanied proximally with a few small denticles.

Male of much smaller size than female, with the body gradually attenuated behind. Cephalic segment comparatively larger, exceeding in length the 3 succeeding segments combined. Last trunkal segment scarcely broader than the genital segment. Anterior antennæ of coarser structure than in female and only composed of 11 joints very unlike in size, the outer 2 rather elongate and forming together a very mobile piece, which admits to be impinged against the preceding part of the antenna. Posterior antennæ, oral parts, and legs of same structure as in female. Genital lobes contiguous at the base inside, and subtriangular in form, their extremity somewhat truncated and provided at the outer corner with a small bristle, at the inner with 2 unequal juxtaposed spines. .

Body in the living animal semipellucid, with a light yellowish gray hue; ovarian tubes in female pale greenish, the ripe ova included within the incubatory pouch being of a somewhat darker green colour.

Length of adult female attaining 4.50 mm; of male 1.90 mm.

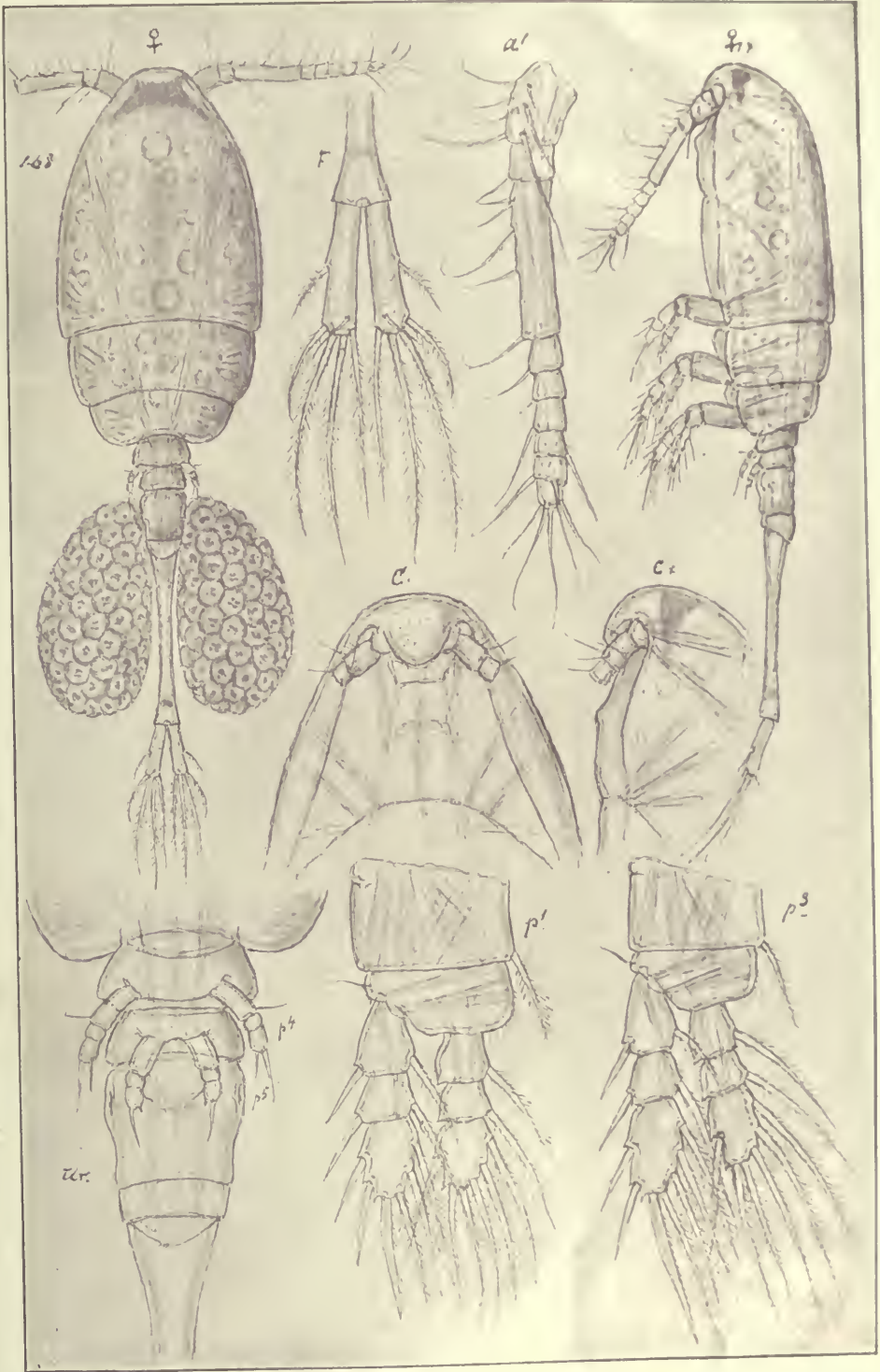
Remarks.—This is the largest and also the most common of the species,

Copepoda

Thamatopsyllidæ

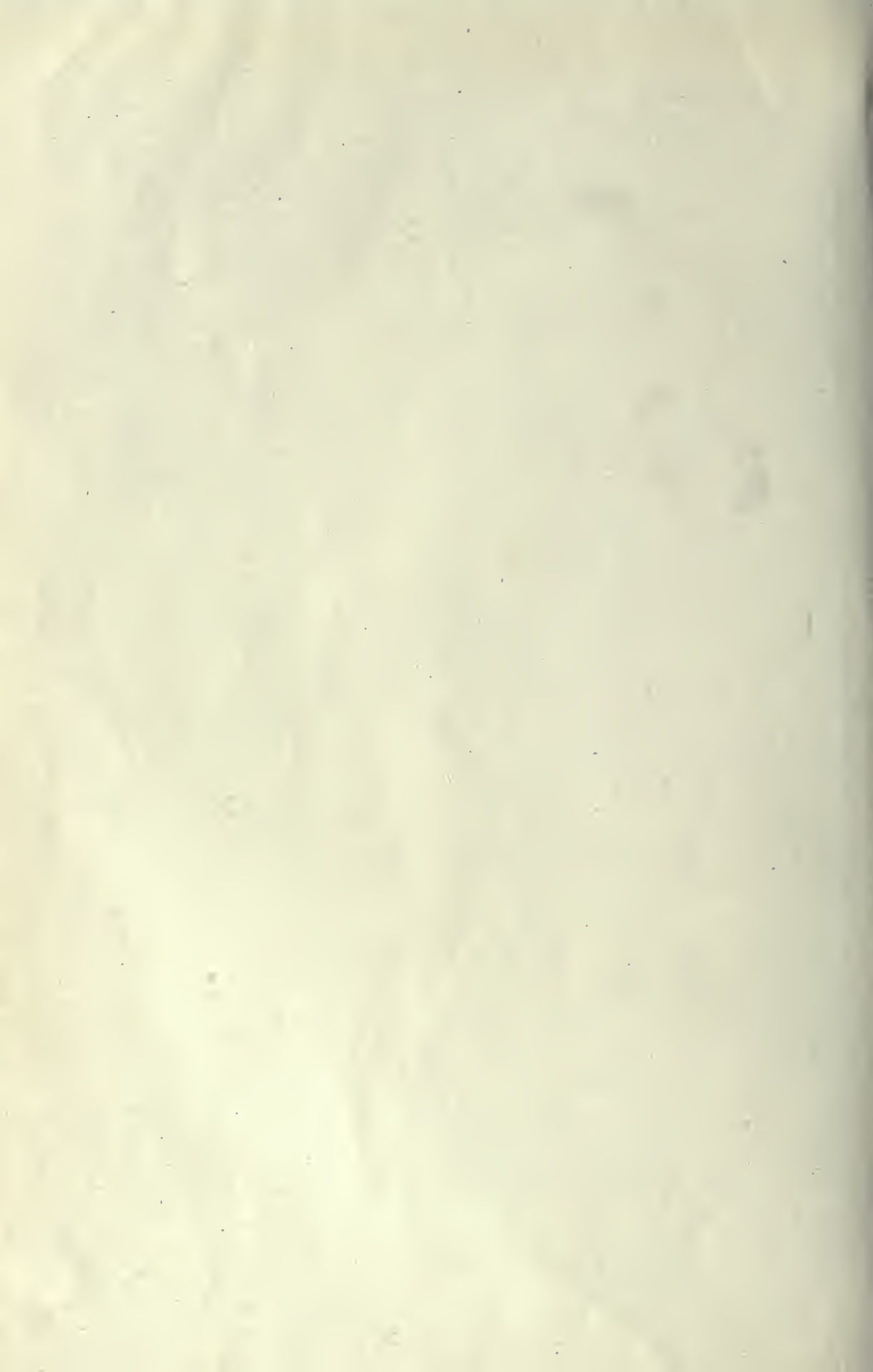
Monstrilloida

Pl. I



G. O. Sars del.

Thaumtopsyllus paradoxus, G. O. Sars

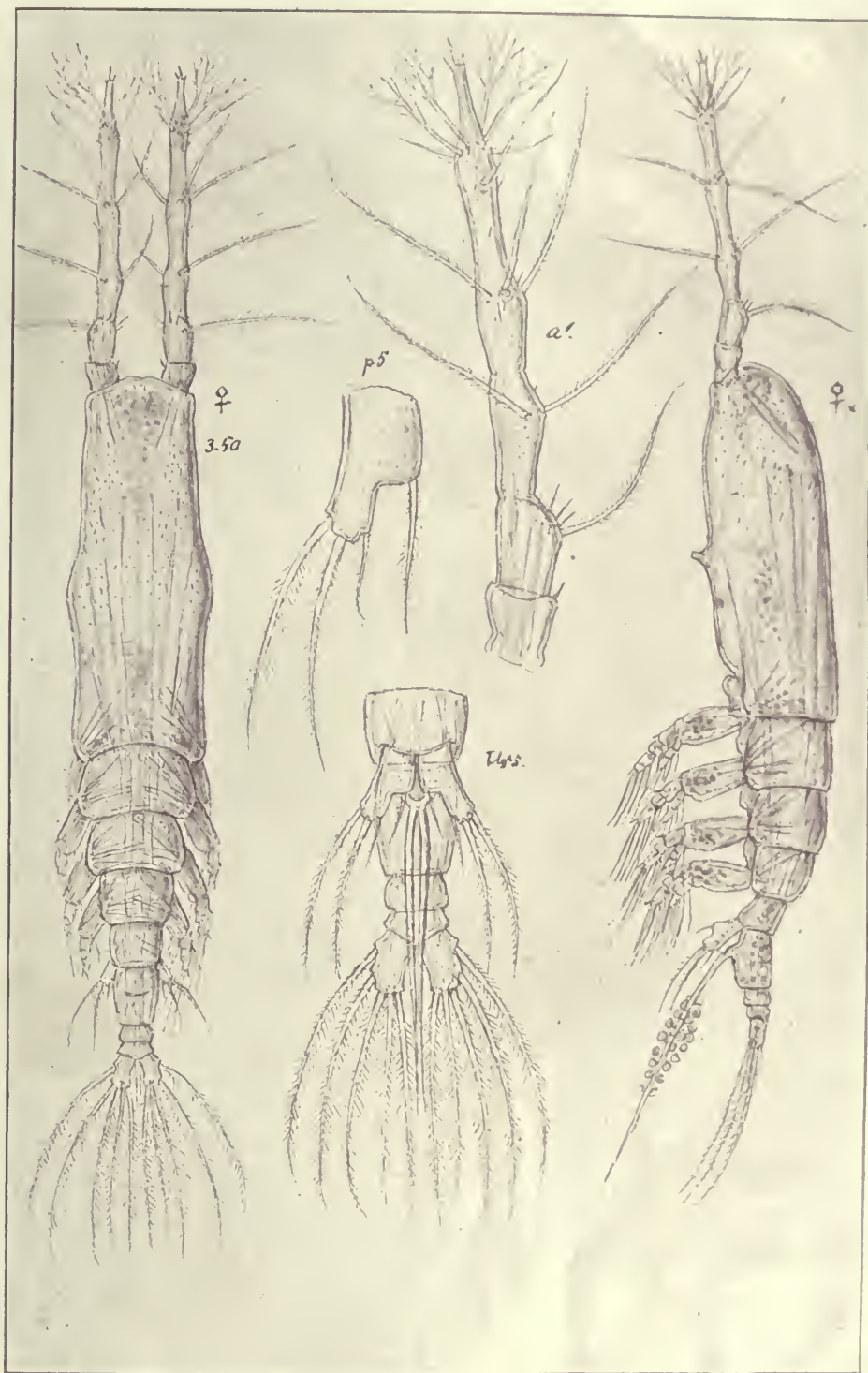


Copepoda

Monstrillidæ

Monstrilloida

Pl. II



G. O. Sars del.

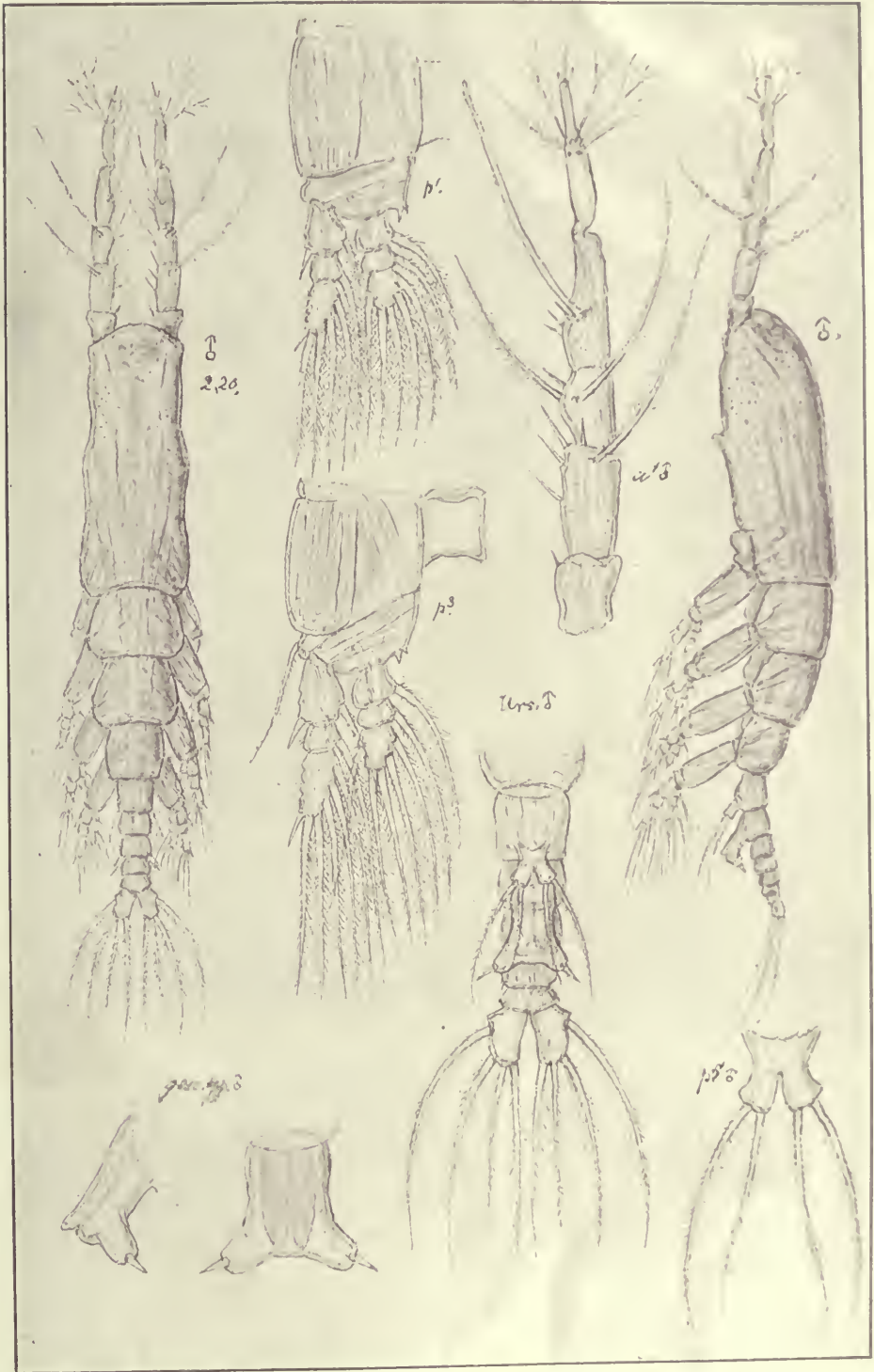
Monstrilla longicornis, Thomps.

Copepoda

Monstrillidæ

Monstrilloida

Pl. III



G. O. Sars del.

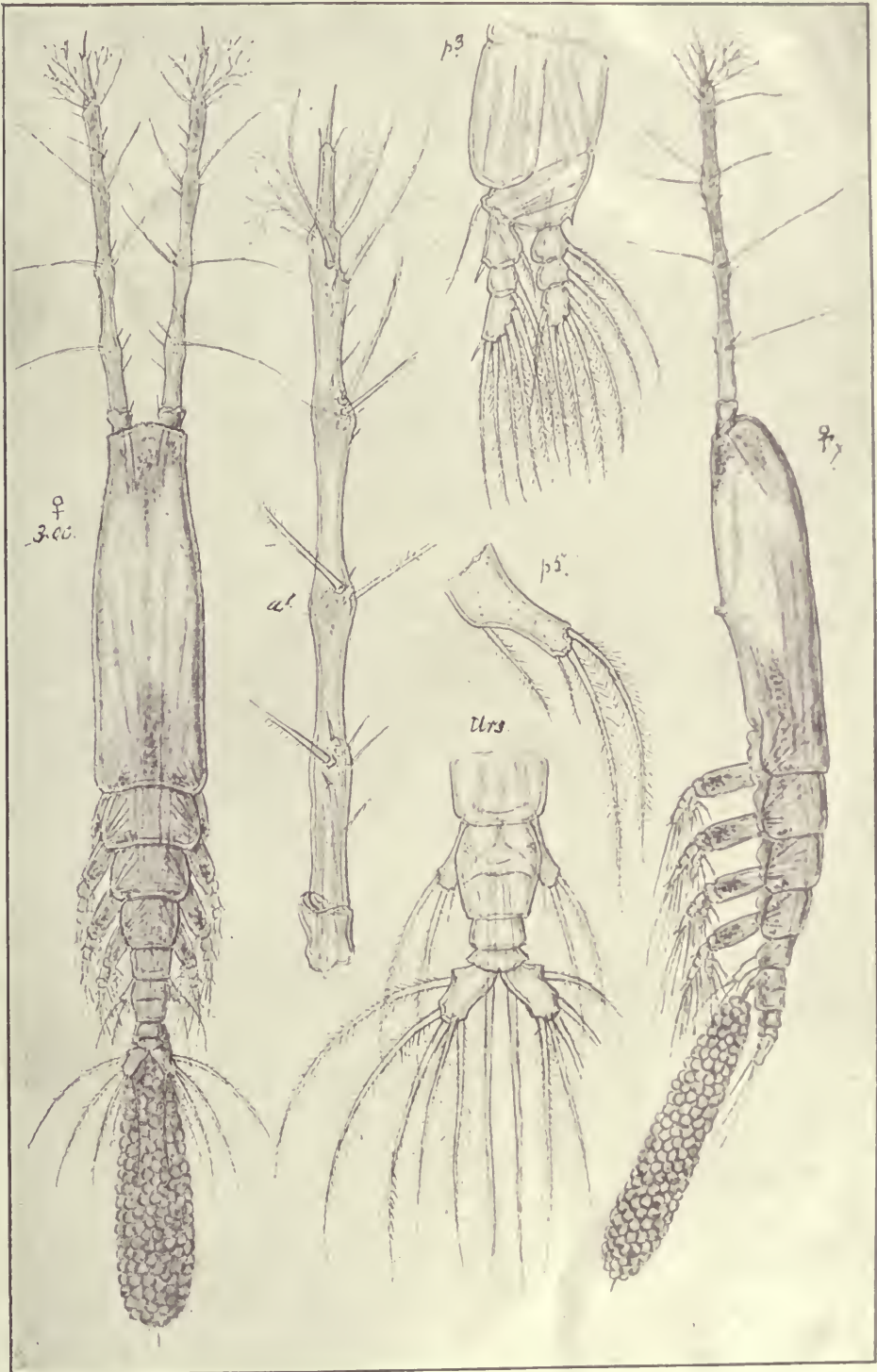
Monstrilla longicornis, Thomps.
(continued)

Copepoda

Monstrillidæ

Monstrilloida

Pl. IV



G. O. Sars del.

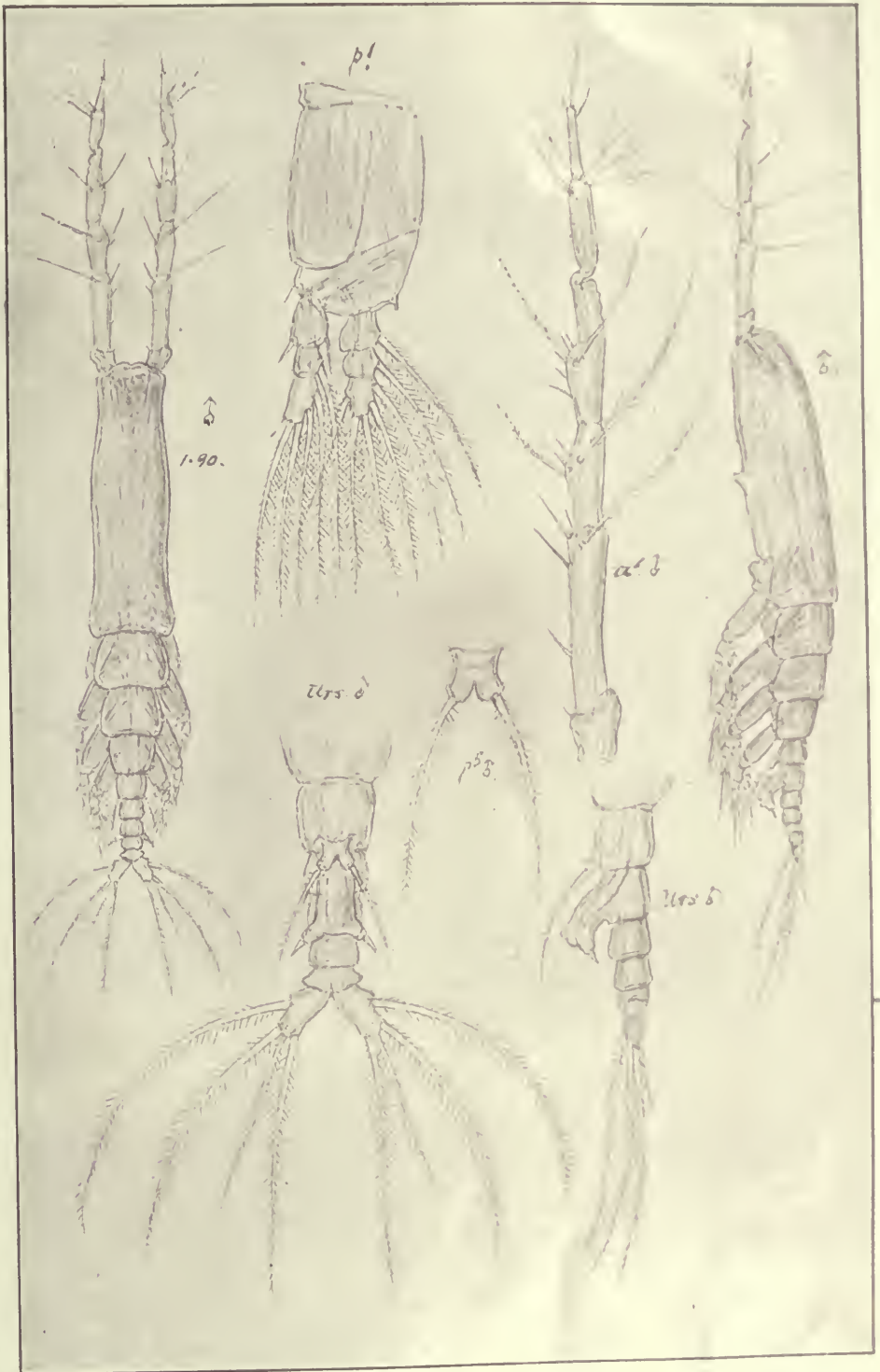
Monstrilla longiremis, Giesbr.

Copepoda

Monstrillidæ

Monstrilloida

Pl. V



G. O. Sars del.

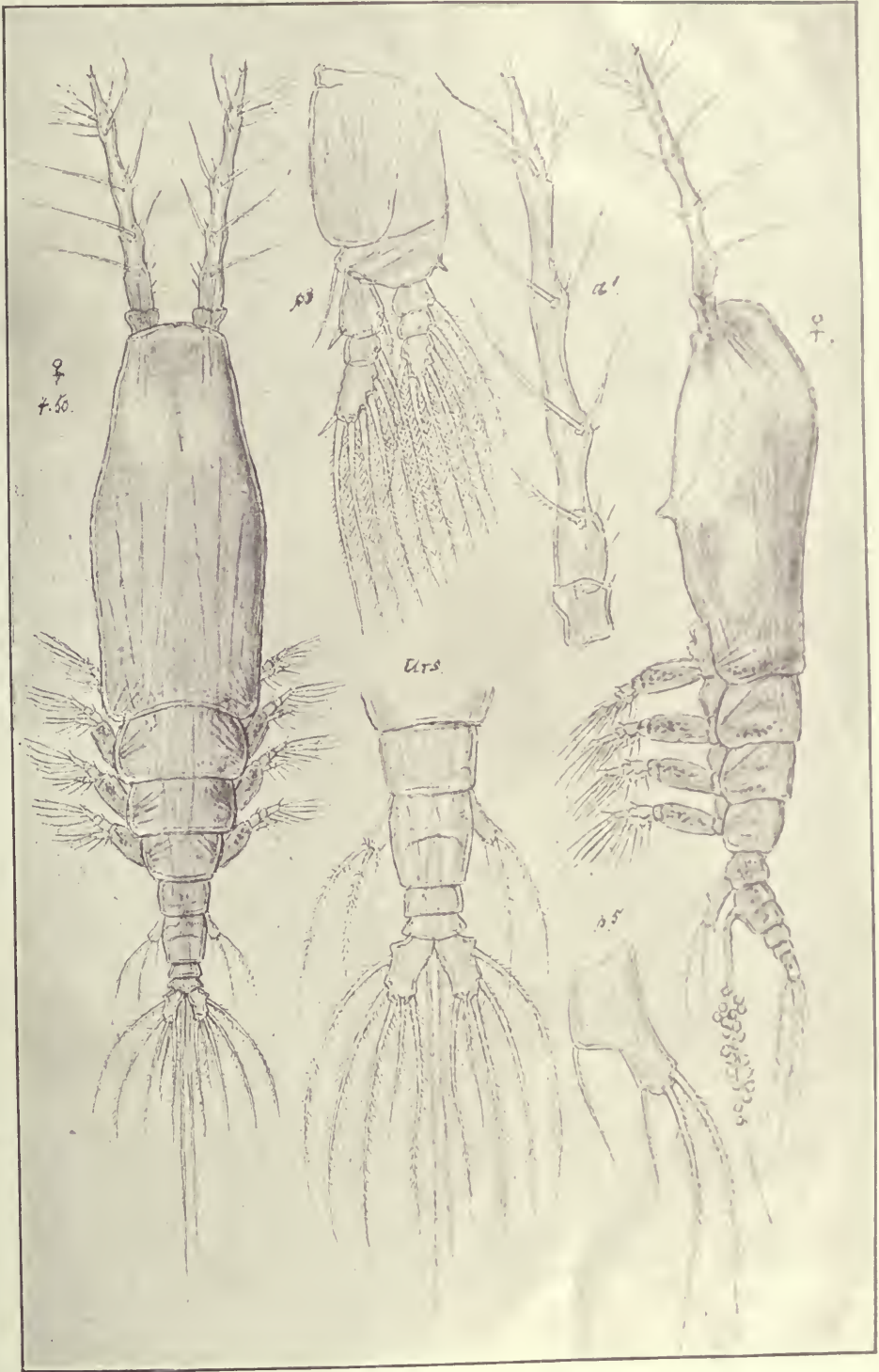
Monstrilla longiremis, Giesbr.
(male)

Copepoda

Monstrillidæ

Monstrilloida

Pl. VI



G. O. Sars del.

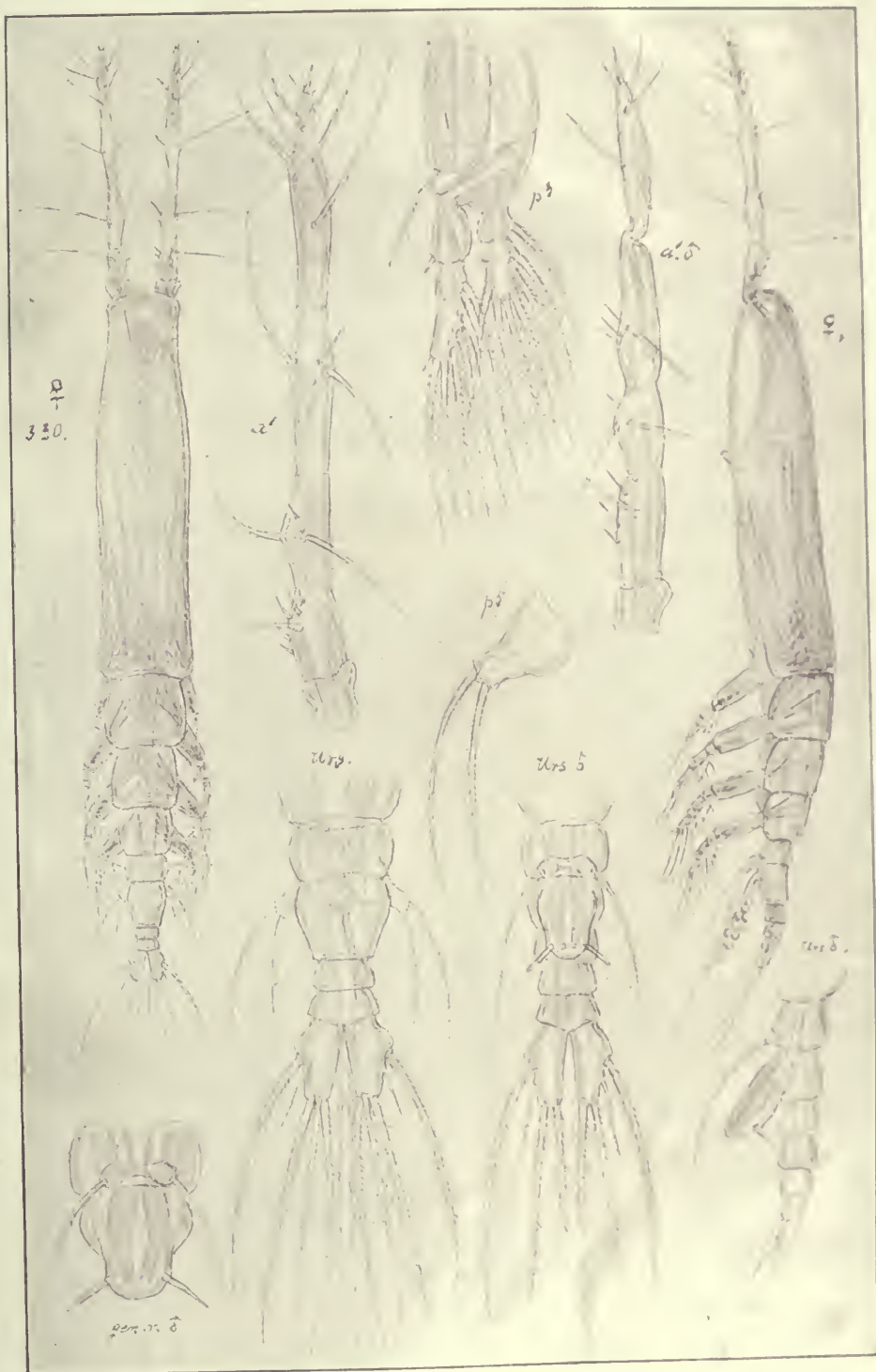
Monstrilla clavata, G. O. Sars

Copepoda

Monstrillidæ

Monstrilloida

Pl. VII



G. O. Sars del.

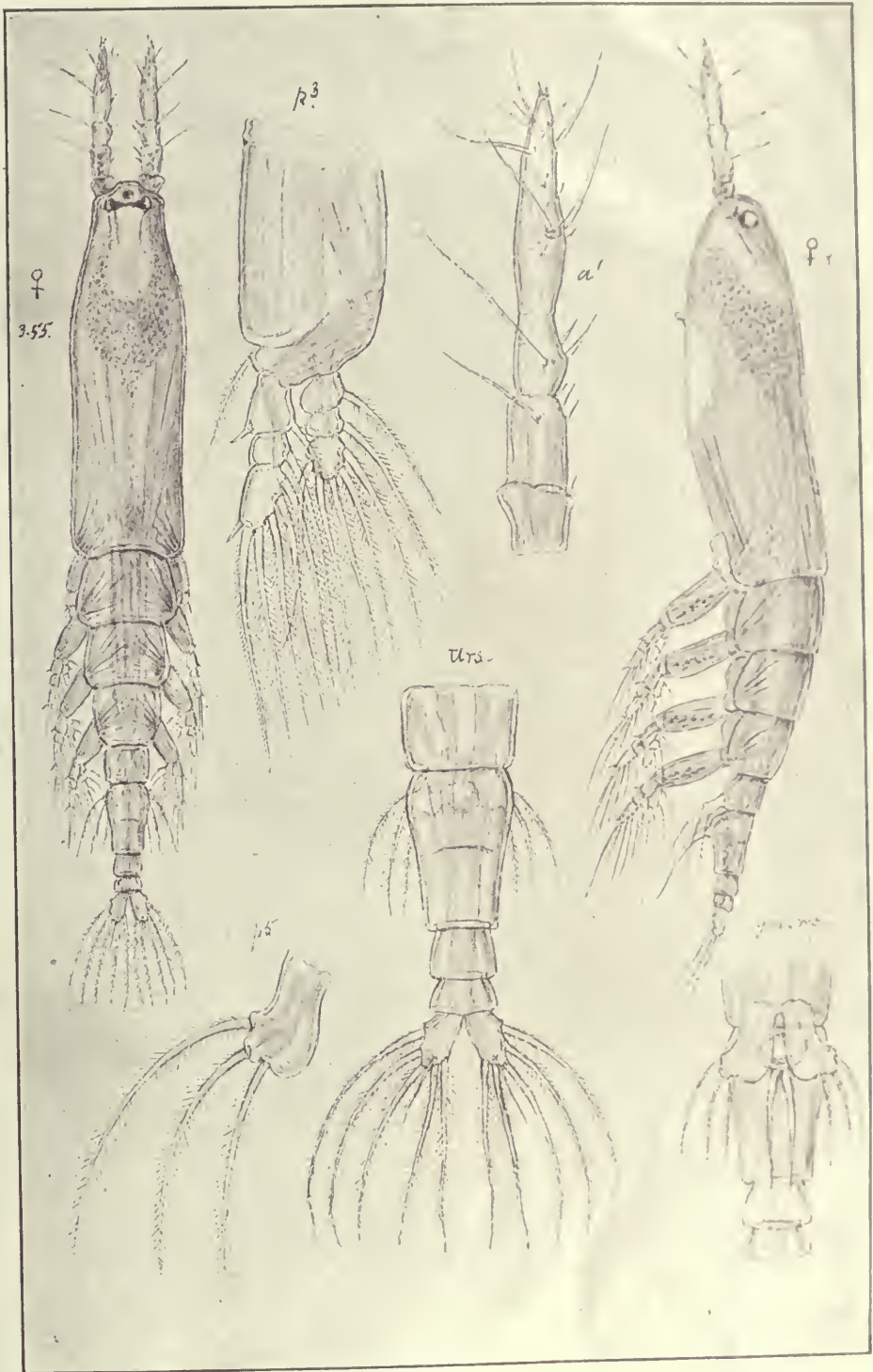
Monstrilla leucopis, G. O. Sars

Copepoda

Monstrillidæ

Monstrilloida

Pl. VIII



G. O. Sars del.

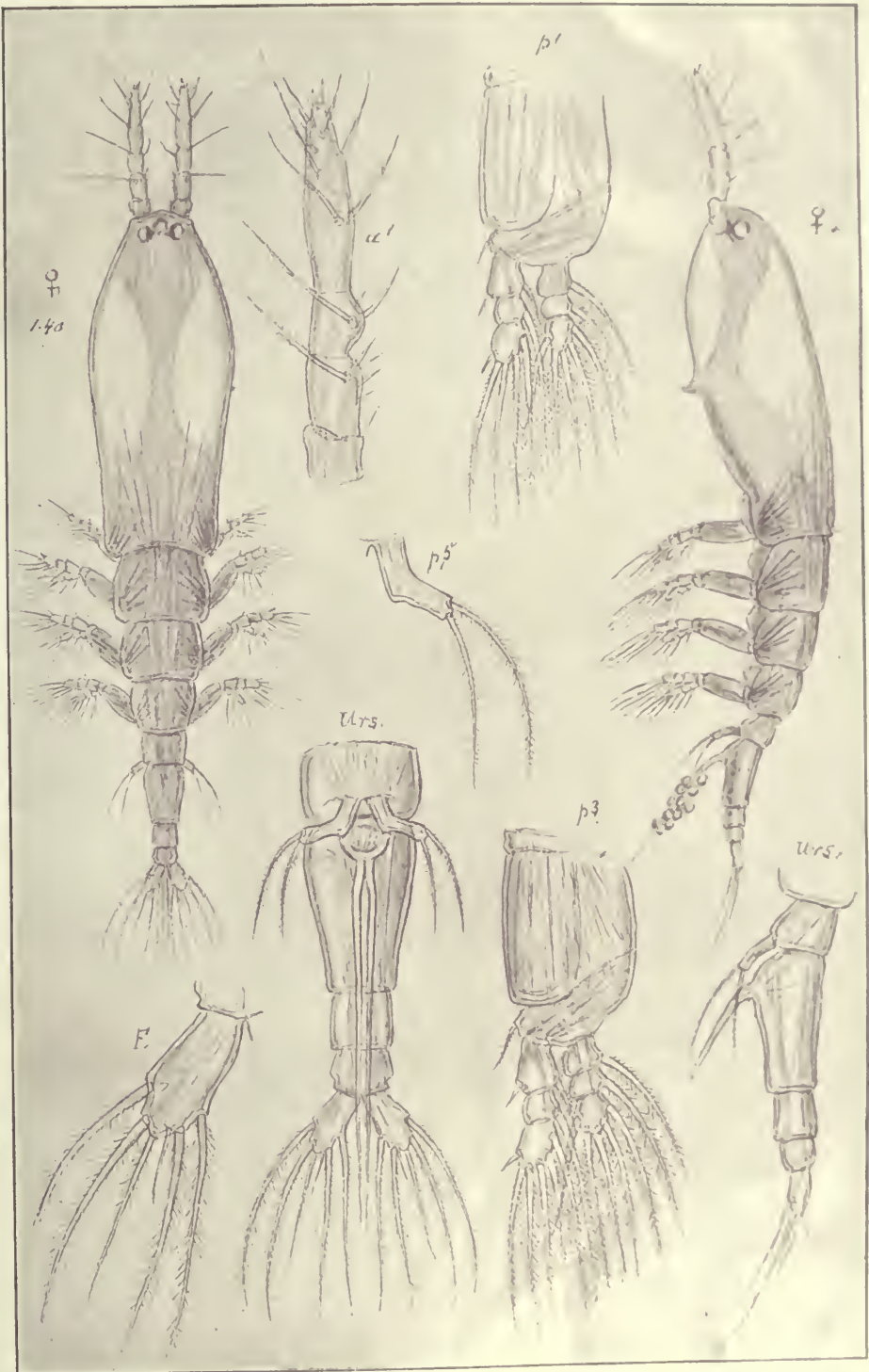
Monstrilla gracilicauda, Giesbr.

Copepoda

Monstrillidæ

Monstrilloida

Pl. IX



G. O. Sars del.

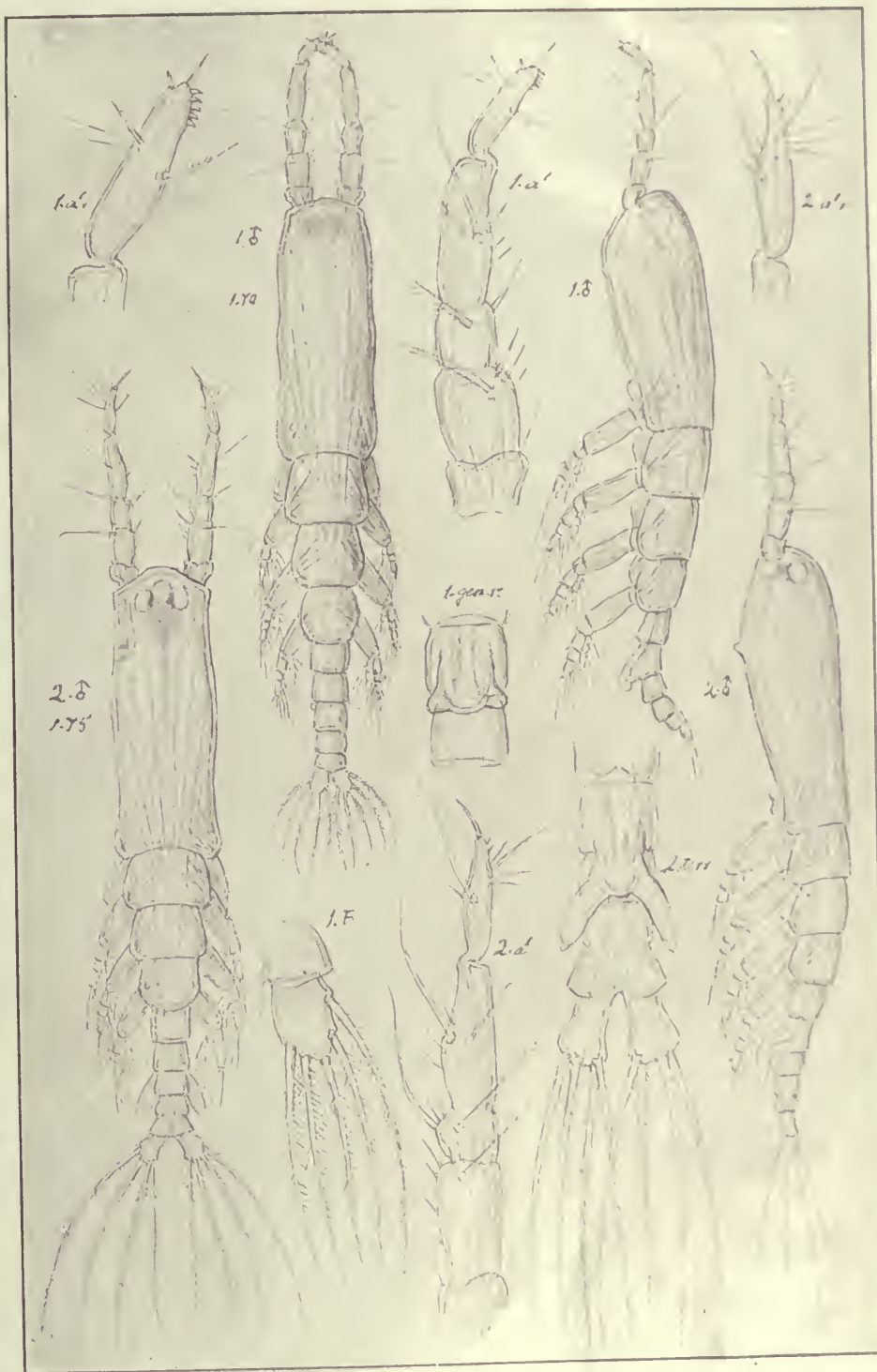
Monstrilla helgolandica, Claus

Copepoda

Monstrillidæ

Monstrilloida

Pl. X



G. O. Sars del.

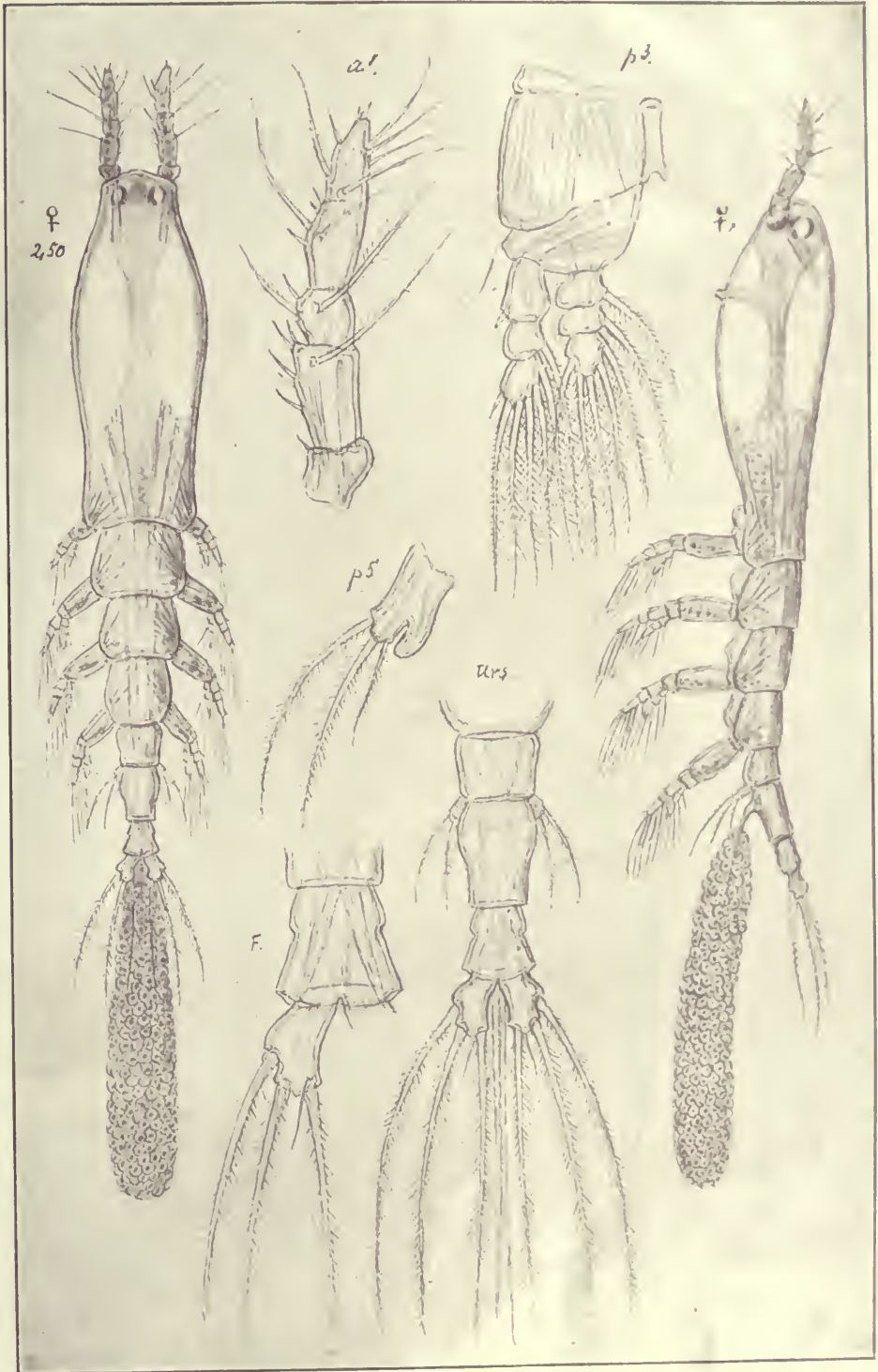
1. *Monstrilla serricornis*, G. O. Sars. ♂
2. *Cymbasoma rigidum*, Thomps. ♂

Copepoda

Monstrillidæ

Monstrilloidea

Pl. XI



G. O. Sars del.

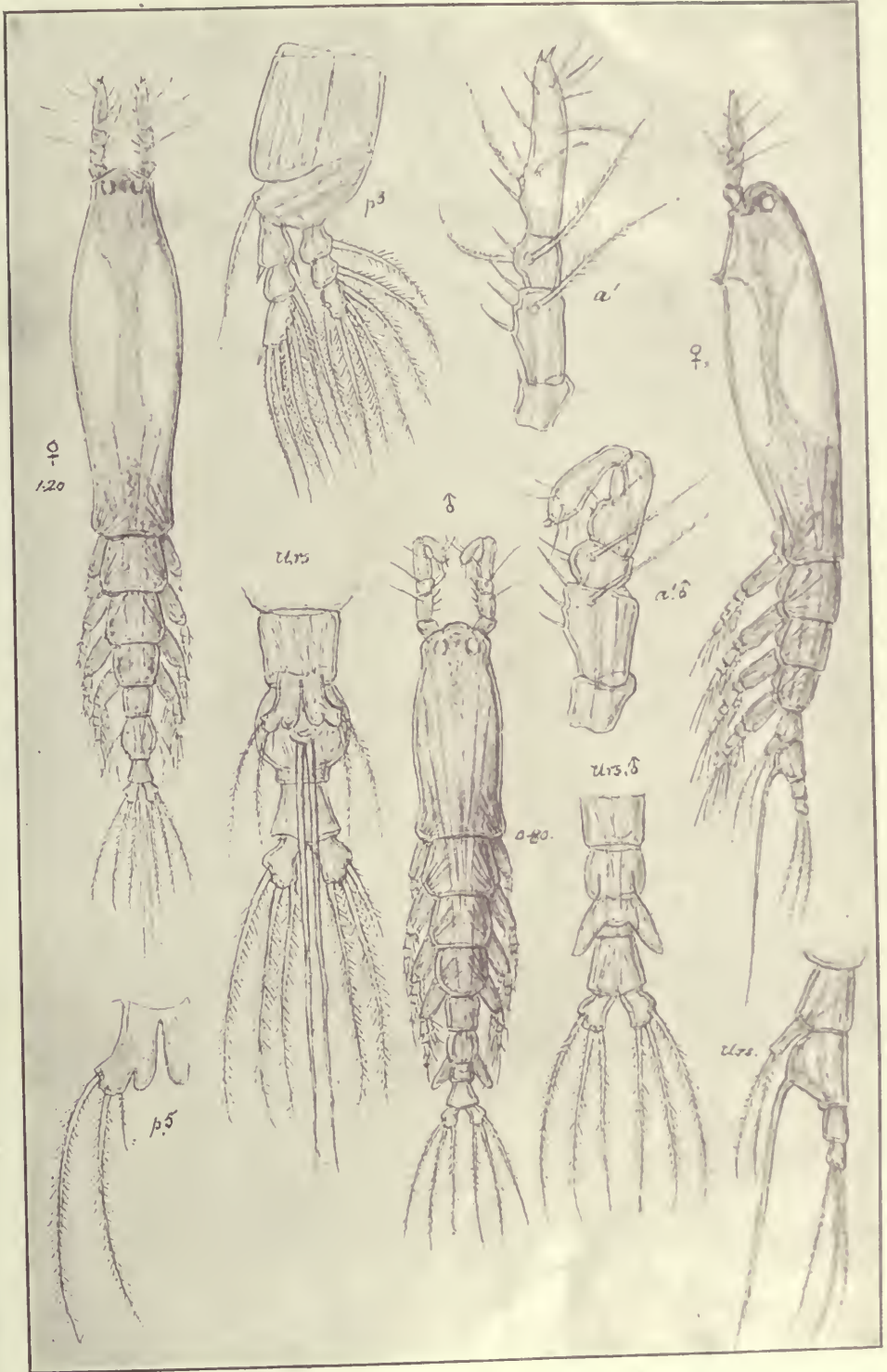
Cymbasoma rigidum, Thomps.

Copepoda

Monstrillidæ

Monstrilloida

Pl. XII



G. O. Sars del.

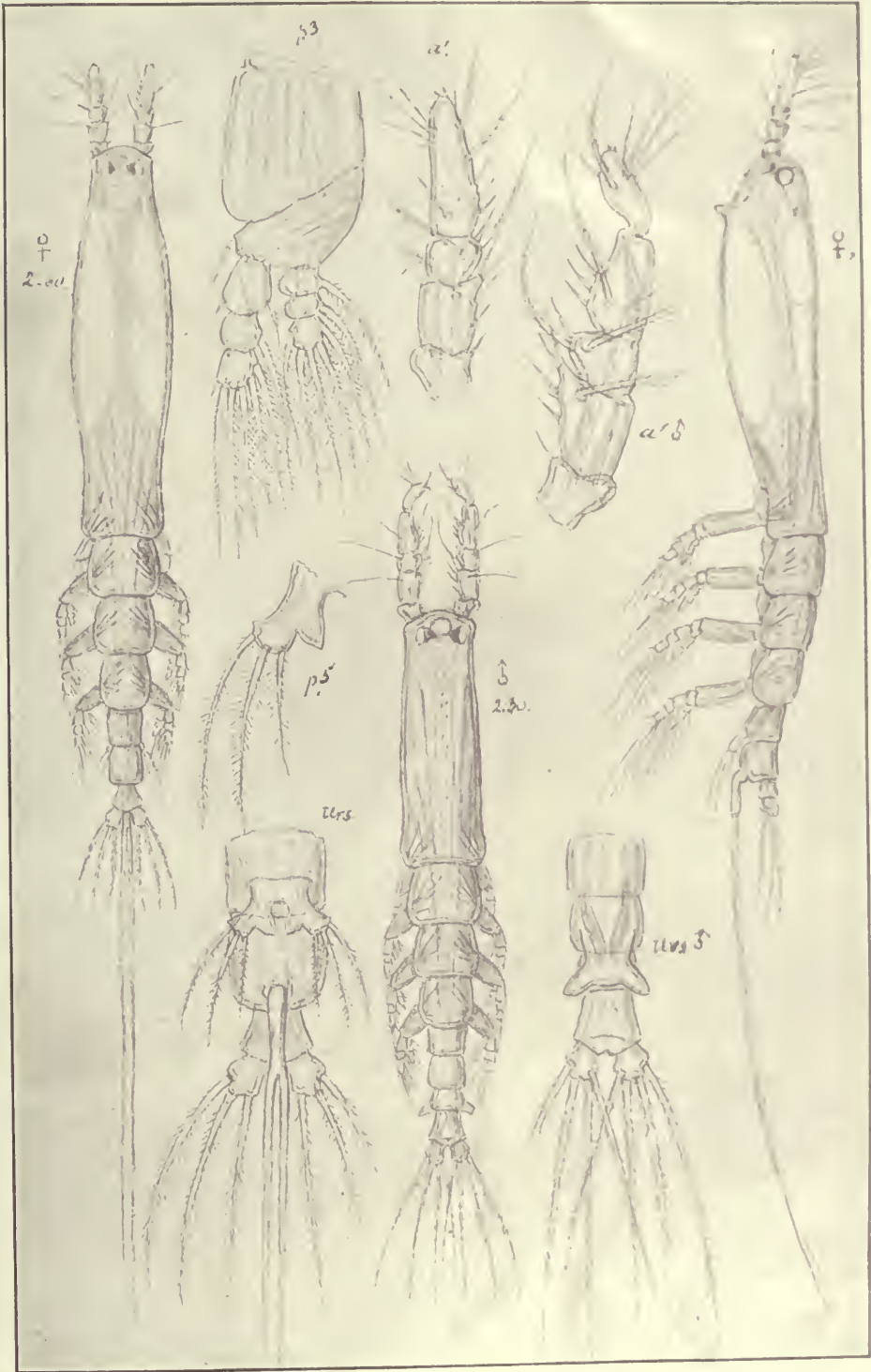
Cymbasoma Thompsoni, (Giesbrecht)

Copepoda

Monstrillidæ

Monstrilloida

Pl. XIII



G. O. Sars del.

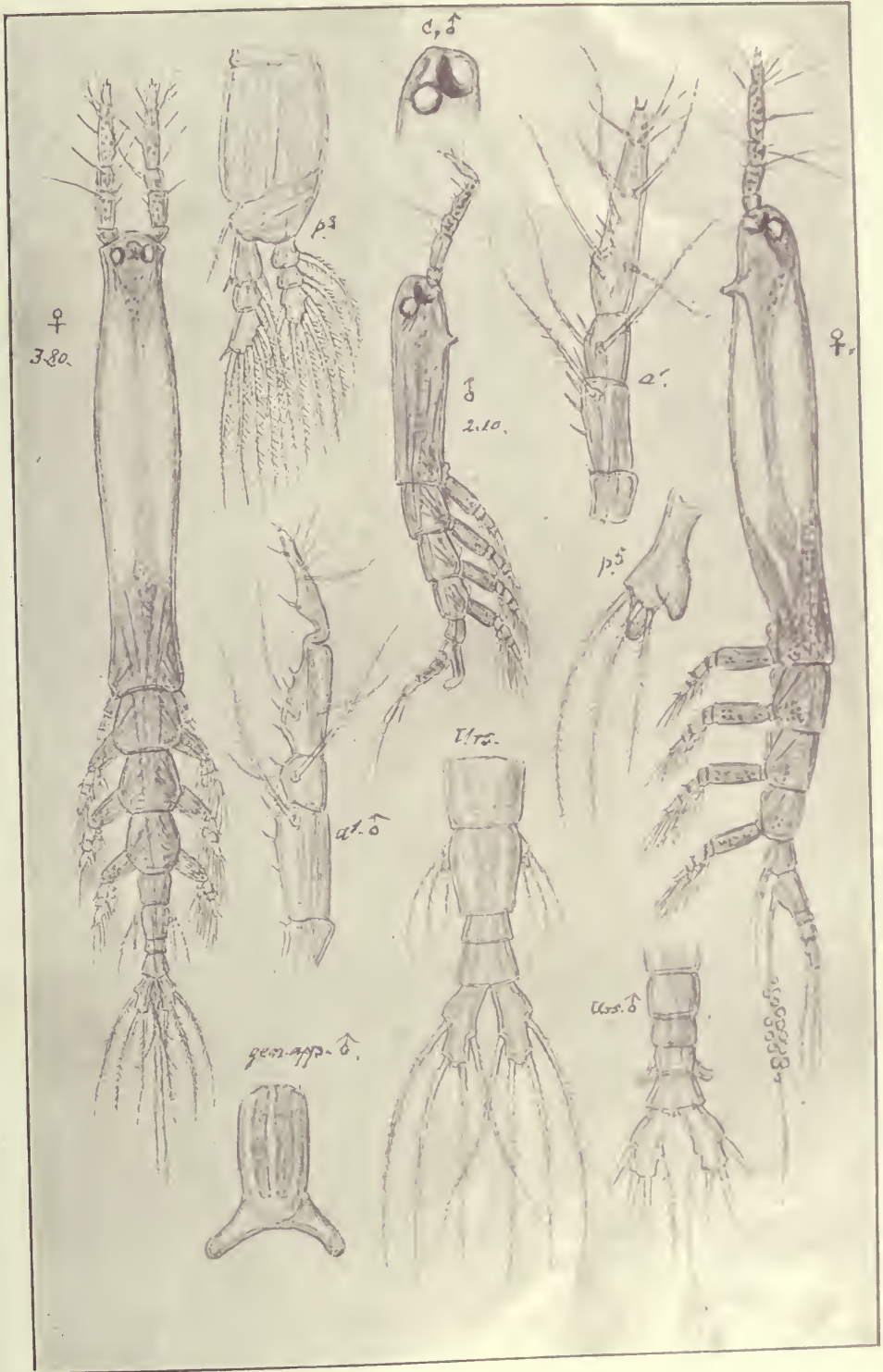
Cymbasoma longispinosum, (Bourne)

Copepoda

Monstrillidæ

Monstrilloida

Pl. XIV



G. O. Sars del.

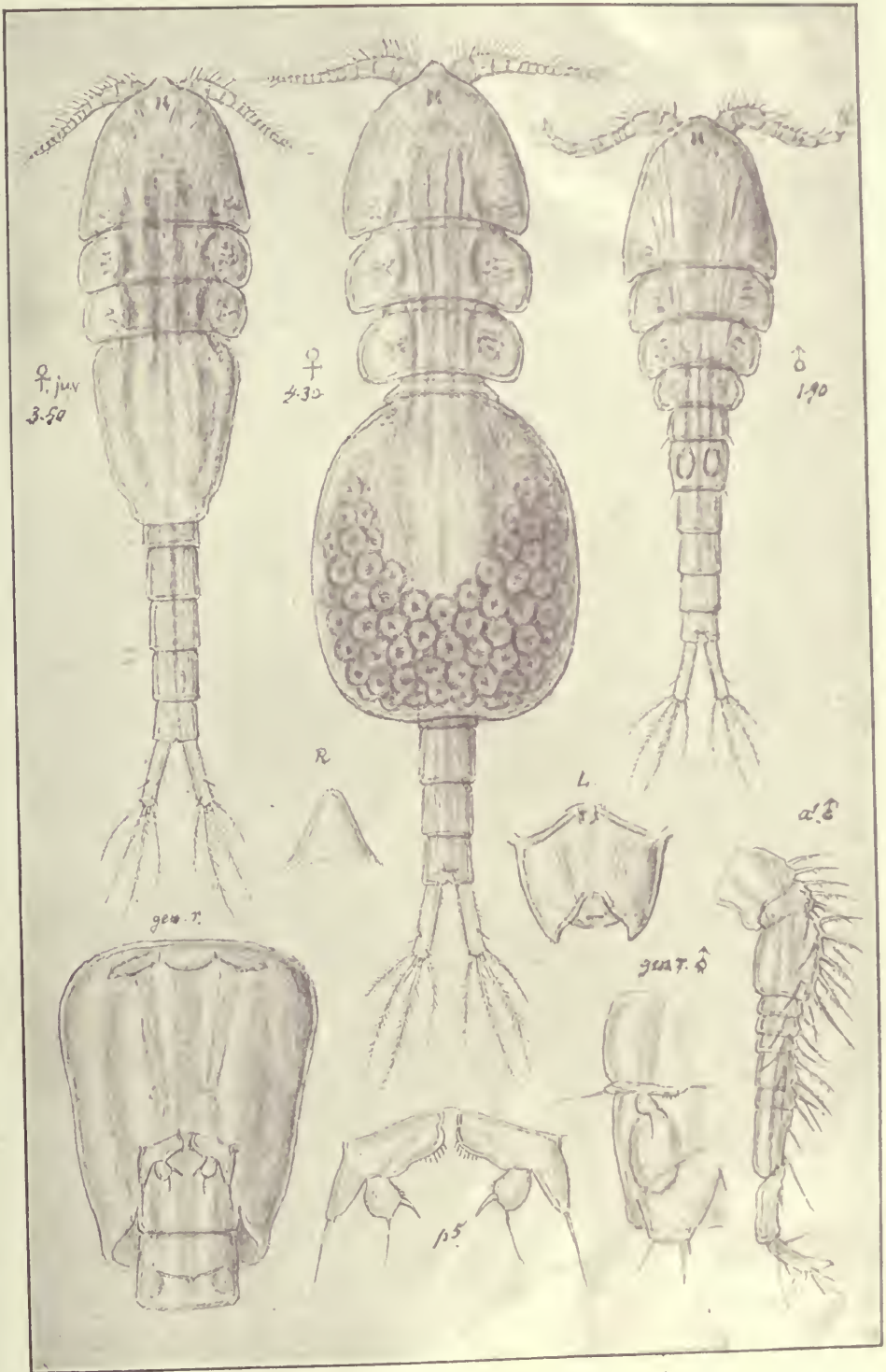
Monstrilopsis dubia, (Scott)

Copepoda

Notodelphyidæ

Notodelphyoida

Pl. XV



G. O. Sars del.

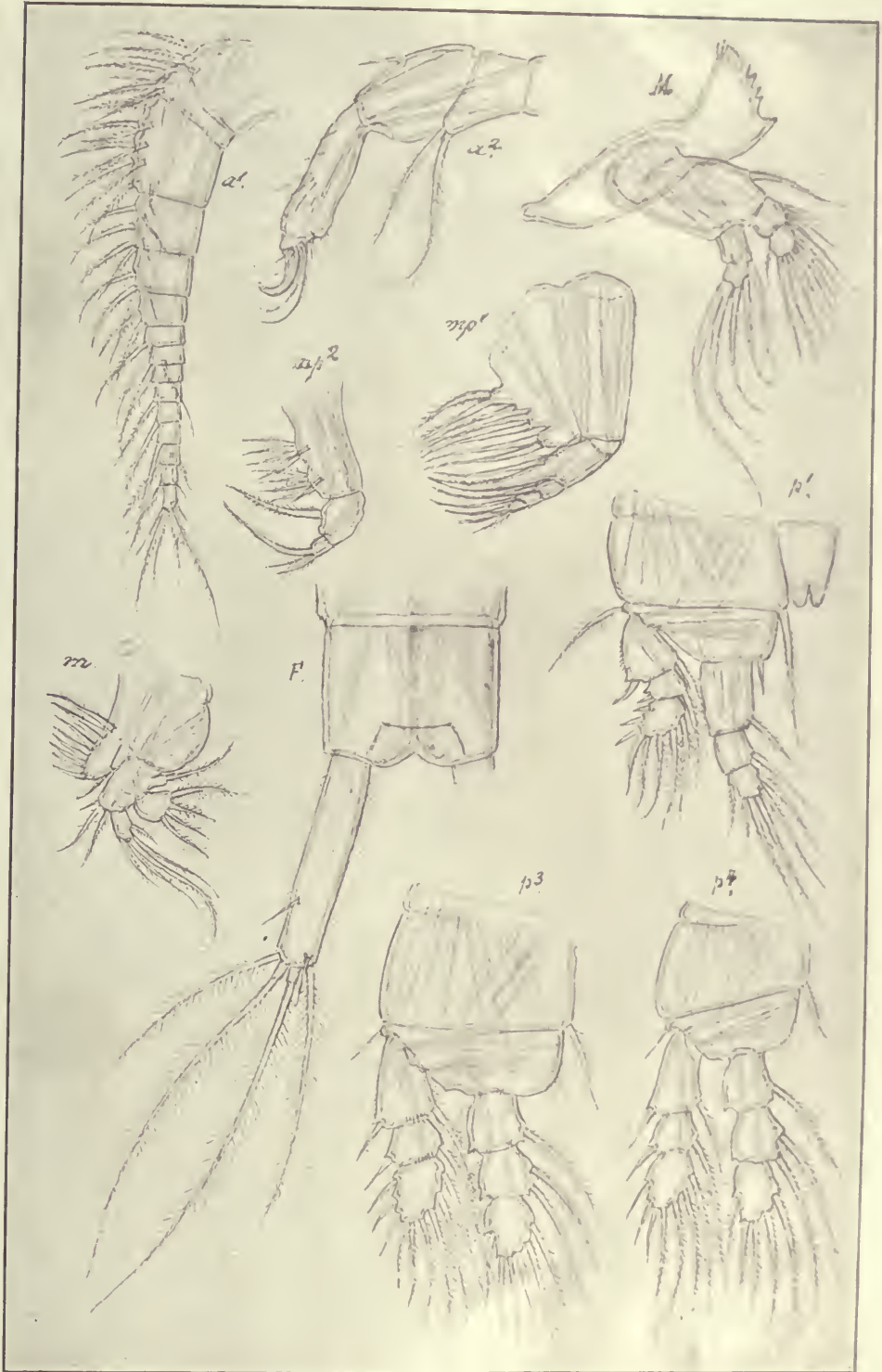
Notodelphys Allmani, Thorell

Copepoda

Notodelphyidæ

Notodelphyoida

Pl. XVI



G. O. Sars del.

Notodelphys Allmani, Thorell
(continued)

and may moreover be recognised by the relative length of the caudal rami, by the shape of the incubatory pouch in the female, and, when examined in the living state, also by the colour of the ripe ova. It may be, that Allman has had before him specimens of this form, but as he has evidently combined in his species *N. ascidicola* several other very different forms, I agree with Thorell in the discarding of the specific name proposed by that author. The form recorded by Buchholtz from the Mediterranean under the name of *N. mediterranea* I am unable to distinguish from the present species.

Occurrence.—I have met with this species in many different places on the Norwegian coast, from the Christiania Fjord to Finmark (Hammerfest). It occurs, often in considerable number, within the branchial cavity of several kinds of simple Ascidians, being generally found attached by the aid of the posterior antennæ to the inner wall of that cavity. When loosened from its hold, the animal moves quickly about in the usual jerking manner observed in most Cyclopoida; but very soon it again get hold of some other place. Male specimens are much more scarce than female ones, and indeed among the numerous specimens of this species collected, I have only succeeded in finding 3 or 4 males.

Distribution.—Coast of Bohuslän (Thorell), British Isles (Brady), coast of France (Canu), Mediterranean (Buchholz).

2. *Notodelphys rufescens*, Thorell.

(Pl. XVII, 1).

Notodelphys rufescens, Thorell, l. c. p. 35, Pl. II, 2.

Specific Characters.—*Female.* Body comparatively a little more slender than in *N. Allmani*, otherwise of a very similar appearance. Incubatory pouch oval in outline, with the posterior extremity evenly rounded. Caudal rami scarcely twice as long as the anal segment, and rather narrow, sublinear in form, with the apical setæ comparatively shorter and less divergent than in *N. Allmani*; bristle of outer edge more remote from the apex. Anterior antennæ almost exactly as in that species. Posterior antennæ however comparatively less slender, with the terminal joint not nearly attaining the length of the other 2 combined. Oral parts and natatory legs very like those parts in *N. Allmani*. Last pair of legs likewise very similar, though having the proximal joint comparatively less broad, and the distal joint of a more irregular shape.

Body, according to Thorell, in the living animal pellucid, of a whitish grey colour, with the ovarian tubes and the ripe ova pale reddish.

Length of adult female attaining 4.20 mm.

Remarks.—The present form is so closely allied to *N. Allmani*, that I have had much trouble in finding any more reliable character to distinguish it from that species. It is however of somewhat smaller size, and, on a closer comparison, the caudal rami are found to differ somewhat in their relative length, and more particularly in the position of the outer-edge bristle, which is conspicuously more remote from the apex than in *N. Allmani*. Moreover the shape of the incubatory pouch is rather different, and, according to Thorell, also the colour of the ovarian tubes and the ripe ova in the living animal.

Occurrence.—A few female specimens of this form were selected from some material collected many years ago off the south coast of Norway. From what species of *Ascidia* they were derived, I am unable to ascertain. Thorell found it in *A. scabra* Müll. and *Aurivillius* in *Phallusia obliqua* Alder.

Distribution.—Coast of Bohuslän (Thorell, *Aurivillius*).

3. *Notodelphys cærulea*, Thorell.

(Pl. XVII, 2).

Notodelphys cærulea, Thorell, l. c. p. 37, Pl. III & IV, 4.

Specific Characters.—*Female.* Body conspicuously more slender than in the 2 preceding species, with the anterior division narrower and the posterior more produced. Incubatory pouch oval in outline, with the greatest width somewhat in front of the middle, posterior extremity evenly rounded. Caudal rami rather shorter and broader than in the 2 preceding species, only very slightly exceeding in length the anal segment, and scarcely more than 3 times as long as they are broad; apical setæ comparatively short, bristle of outer edge considerably remote from the apex, being attached nearly in the middle of the edge. Antennæ, oral parts, and natatory legs not exhibiting any marked difference from those appendages in the preceding species. Last pair of legs, however, rather different in shape, the proximal joint being not nearly so broad, with the inner corner less prominent; distal joint rounded in shape and less conspicuously constricted at the base.

Body in the living animal whitish pellucid, with the ovarian tubes and the ripe ova of a bright bluish colour.

Length of adult female attaining 4.30 mm.

Remarks.—The above-described form may be easily distinguished from the 2 preceding ones by the comparatively much shorter and broader caudal rami, and by the position of the outer-edge bristle on these rami. In the living state the female of this species may moreover at once be recognised by the bright bluish colour of the ova included within the incubatory pouch.

Occurrence.—Several specimens of this form have been selected from material collected in different places on the south coast of Norway. Thorell found it rather frequently in *Ascidia venosa*, and Aurivillius records it from *Phallusea virginea*.

Distribution.—Coast of Bohuslän (Thorell), British Isles (Brady).

4. *Notodelphys agilis*, Thorell.

(Pl. XVII, 3).

Notodelphys agilis, Thorell, l. c. p. 40, Pl. IV & V, 6.

Specific Characters.—*Female.* Body moderately slender, resembling in shape that of *N. rufescens*, but of much smaller size. Incubatory pouch sub-oval in outline, slightly widening distally, with the hind extremity broadly rounded. Caudal rami rather slender, nearly twice as long as the anal segment, and somewhat narrowed in their outer part, with the outer edge finely ciliated, the inner smooth; apical setæ of moderate length; bristle of outer edge attached to a distinct ledge in the middle of the edge. Both pairs of antennæ somewhat more slender than in the 3 preceding species. Last pair of legs with the proximal joint rather broad and quite smooth, digitiform process comparatively short; distal joint not at all constricted at the base, and of a somewhat irregular form, with the outer edge angularly bent in the middle and the spine of the inner edge very thin.

Body in the living animal whitish pellucid, with the ripe ova dark fuscous in colour.

Length of adult female scarcely exceeding 3.60 mm.

Remarks.—This form also is most readily distinguished by the shape of the caudal rami, and more particularly by the exactly median position of the outer-edge bristle on these rami. Otherwise it agrees closely with the 3 preceding species.

Occurrence.—I have met with this form in many different places on the Norwegian coast, from the Christiania Fjord to Finmark (Hammerfest). It is found in different kinds of Ascidians, most frequently perhaps in *A. parallelo-*

gramma. In its movements it is more active than most other species, and thus deserves the specific name given to it by Thorell.

Distribution.—Coast of Bohuslän (Thorell), British Isles (Brady), coast of France (Canu).

5. *Notodelphys tenera*, Thorell.

(Pl. XVIII, 1).

Notodelphys tenera, Thorell, l. c. p. 36, Pl. III, 3.

Specific Characters.—*Female*. Body comparatively slender, with the anterior division somewhat dilated in its anterior part. Cephalic segment exceeding in length the 2 succeeding segments combined, and conically produced in front. Incubatory pouch, when fully developed, of rather a characteristic shape, being almost gibbously dilated in the middle and fully as broad as it is long. Caudal rami rather narrow, and exceeding the anal segment by about $\frac{1}{4}$ of their length; apical setæ unusually slender and elongated; bristle of outer edge occurring close to the apex. Both pairs of antennæ conspicuously more slender and elongated than in the other known species. Last pair of legs with the proximal joint short, but rather broad, and having the digitiform process large and extended obliquely outwards; distal joint very narrow at the base, but gradually widening distally, so as to assume a somewhat claviform shape, spine and seta issuing close together from the inner distal corner.

Body in the living animal whitish hyaline, with the ripe ova yellowish red in colour.

Length of adult female 3.20 mm.

Remarks.—The present species may be recognised by the unusual slenderness of both pairs of antennæ and the rather elongated caudal setæ. The shape of the caudal rami and the position of the outer-edge bristle is also peculiar. Another easily observable distinguishing character, not mentioned by Thorell, is derived from the shape of the incubatory pouch, which differs conspicuously from that in any of the other known species.

Occurrence.—I have taken this form occasionally in 3 widely remote localities on the Norwegian coast, viz., Risør, Trondhjem Fjord, and Valdersund on the Nordland coast. The specimens were found in the branchial cavity of *A. canina*.

Distribution.—Coast of Bohuslän (Thorell).

6. *Notodelphys elegans*, Thorell.

(Pl. XVIII, 2).

Notodelphys elegans, Thorell, l. c. p. 39, Pl. IV, 5.

Specific Characters.—*Female.* Body less slender than in any of the preceding species, with the cephalic segment comparatively large, considerably exceeding the length of the 2 succeeding segments combined. Incubatory pouch nearly of equal width throughout and obtusely truncated behind. Caudal rami shorter and broader than in *N. tenera*, only slightly exceeding in length the anal segment, and scarcely more than 3 times as long as they are broad; apical setæ comparatively short; bristle of outer edge occurring at a short distance from the apex. Antennæ comparatively far less slender than in the said species, the posterior ones being in particular distinguished by the unusually short and stout terminal joint. Last pair of legs very unlike those in *N. tenera*, the proximal joint being nearly quadrate in form and finely denticulate inside, with the digitiform process extending straight backwards; distal joint broadly oval in form and scarcely at all constricted at the base, spine of inner edge rather strong.

Body of the living animal, according to Thorell, of a pale yellowish hue, with the ripe ova fuscous green.

Length of adult female about 3 mm.

Remarks.—This species may be easily distinguished from the preceding ones by the less slender form of the body and the shape of the incubatory pouch. The structure of the posterior antennæ, and more particularly that of the last pair of legs, is also rather peculiar. Moreover the caudal rami, as usual, exhibit some well marked distinguishing characters.

Occurrence.—Two or 3 female specimens only of this form have as yet come under my notice. They were selected from some material collected on the south coast of Norway, the exact locality not being noted. Thorell found this species within the branchial cavity of *Styela intestinalis*.

Distribution.—Coast of Bohuslän (Thorell), coast of France (Canu).

7. *Notodelphys prasina*, Thorell.

(Pl. XVIII, 3).

Notodelphys prasina, Thorell, l. c. p. 41, Pl. V, 7.Syn: *Notodelphys pusilla*, Buchholtz.

Specific Characters.—*Female.* Body comparatively short and stout, considerably dilated in its anterior part. Cephalic segment rather large, and conically produced in front. Incubatory pouch subquadrangular in outline,

being of almost equal width throughout and transversely truncated behind. Caudal rami very short, being scarcely as long as they are broad, and subquadrate in form, with the outer edge densely hairy; apical setæ rather strong, the 2 middle ones considerably longer than the others and conspicuously dilated at some distance from the base; bristle of outer edge occurring close to the apex. Anterior antennæ fully as long as the cephalic segment, and having the setæ rather long and slender. Posterior antennæ of the usual structure, with the terminal joint about the length of the other 2 combined. 1st pair of legs with the rami of nearly equal length, terminal joint of the outer one bent abruptly outwards, at nearly a right angle to the preceding part; joints of inner ramus triangularly produced at the end outside. Last pair of legs very small, with the proximal joint extending inwards as a narrow band-like plate finely spinulose at the edge, digitiform process recurved; distal joint comparatively small and subfusiform in shape, being conically produced at the end, spine of inner edge occurring about in the middle.

Body in the living animal rather pellucid, with the ovarian tubes and the ripe ova of a bright grass-green colour.

Length of adult female scarcely exceeding 1.80 mm.

Remarks.—This is much the smallest of the species here recorded, and may moreover at once be recognised by the very short caudal rami, as also, when examined in the living state, by the bright green colour of the ovarian tubes and the ripe ova. The form recorded by Buchholtz from the Mediterranean under the name of *N. pusilla* is quite certainly identical with Thorell's species.

Occurrence.—I have taken this form, often in considerable number, from the branchial cavity of several kinds of Ascidians, most frequently however in *Phallusia mentula*. It seems to be distributed along the whole south and west coasts of Norway, at least to the Trondhjem Fjord.

Distribution.—Coast of Bohuslän (Thorell), British Isles (Brady), Mediterranean (Buchholtz).

Gen. 2. *Agnathaner*, Canu, 1892.

Generic Characters.—Body (of male) resembling in shape that in *Noto-delplys*, being quite straight, with the anterior division somewhat dilated and well marked off from the posterior; the latter narrow and composed of 5 segments. Caudal rami sublinear in shape, with the normal number of setæ.

Antennæ and legs built on the very same type as in *Notodelphys*. Oral parts however (in male) considerably reduced, so as not to be adapted for mastication. Anterior lip transformed to a somewhat tubular prominence containing the outer part of the gullet. Mandibles with the palp normally developed, biramous, masticatory part however reduced to a short simple point. Maxillæ with the masticatory lobe likewise much reduced, but having the other parts distinctly defined. Anterior maxillipeds without any setiferous lobes inside, and terminating in a single straight spine. Posterior maxillipeds extremely small and rudimentary.

Remarks.—The exact limits of this genus cannot at present be stated, as only the male sex is as yet known. It is very likely to believe that the female will be found to exhibit several essential differences from the male, and it is even not improbable that the structure of the oral parts, upon which the present genus has chiefly been founded, will turn out to be rather different in the female sex. Canu placed this genus, on account of the reduced oral parts, next to the genus *Enterocola*. It is however otherwise very different from that genus, and evidently so closely related to *Notodelphys*, that in any case it ought to be included in the same family with it. Two different species of this genus have been recorded by Canu, both of them only observed in the male sex. The one of these species also occurs on the Norwegian coast, and will be described below.

8. *Agnathaner typicus*, Canu.

(Pl. IX).

Agnathaner typicus, Canu, Copépodes du Boulonnais, p. 211, Pl. XVII, figs. 1—10.

Specific Characters.—*Male.* Body rather slender, with the anterior division conspicuously dilated in the middle. Cephalic segment comparatively large, occupying more than half the length of the anterior division, and gradually somewhat contracted anteriorly, frontal part narrowly truncated and produced below to a recurved rostrum. The 3 succeeding segments gradually diminishing in size, and having the epimeral plates somewhat exstant and separated by deep lateral incisions. Last truncal segment very small, with the lateral parts not expanded. Tail rather slender, almost attaining half the length of the anterior division, with the segments gradually diminishing in size behind; 1st segment somewhat swollen, to receive the 2 usual spermatophores. Caudal rami narrow linear in shape and not at all divergent, exceeding somewhat in length the anal segment, and about 3 times as long as they are broad; apical

setæ of very unequal length, the innermost but one being much the longest and nearly attaining the length of the tail, the innermost seta considerably smaller than the outermost; bristle of outer edge attached a little beyond the middle, dorsal bristle near the end of the ramus. Eye well developed. Anterior antennæ of moderate size, not however attaining the length of the cephalic segment, and composed of 13 well-defined joints rather densely clothed with setæ; hinge, as in *Notodelphys*, occurring between the penultimate and antepenultimate joints. Posterior antennæ almost of exactly same structure as in *Notodelphys*. Natatory legs well developed, with both rami 3-articulate and of about equal size, the outer one armed outside and at the tip with slender cultriform spines. Last pair of legs very small and rudimentary, with the proximal joint quite short and produced outside to the usual digitiform process; distal joint rounded, scale-like, with a thin bristle at the tip and a very minute spine inside.

Colour of the living animal not yet ascertained.

Length of the specimen examined 1.15 mm.

Remarks.—Though the figure of the animal (dorsal view) in Canu's work does not fully agree with that here given, I cannot doubt that these 2 forms are identical, as no obvious difference could be detected in the structure of the several appendages.

Occurrence.—A solitary male specimen of this form was found in some dredged material taken at Grimstad, south coast of Norway, from a depth of about 20 fathoms.

Distribution.—Coast of France (Canu).

Fam. 2. Doropygidæ.

General Characters.—Body of female more or less compressed and curved ventrally, with the anterior and posterior divisions sharply marked off from each other; that of male more slender, with less sharply marked limit between the 2 chief divisions. Head well defined from trunk, and produced in front to a blunt rostral prominence, lateral parts deflexed and rounded off. 1st segment of trunk distinctly defined both in front and behind, but of much smaller size than the succeeding ones. The last 2 trunkal segments in female united, to form dorsally the large and prominent incubatory pouch. Tail

cylindrical in shape, and in most cases only composed of 4 distinctly defined segments. Caudal rami with the setæ much obliterated, in some cases apparently wholly absent, in other cases replaced by curved hooks. Anterior antennæ short and stout, deflexed, with the number of joints more or less reduced; those in male, as a rule, of the very same structure as in female. Posterior antennæ distinctly prehensile, terminating in a more or less strong claw. Oral parts on the whole well developed, though the posterior maxillipeds in some cases may be rather reduced. The 4 anterior pairs of legs, as a rule, not adapted for swimming, and of somewhat different structure in the different genera. Last pair of legs generally less rudimentary than in the *Notodelphyidæ*, rarely quite absent.

Remarks.—This family was proposed in the year 1878 by Prof. Brady, to include the 3 genera *Doropygus*, *Notopterophorus* and *Botachus*, which formerly were referred by Thorell to his family *Notodelphyidæ*. I am of opinion that this family ought to be maintained, although indeed some of the forms apparently exhibit a rather close relationship to the genus *Notodelphys*. However, as indicated in the above-given general characteristic of the family, certain very conspicuous peculiarities are found, which are common to all the forms, and by which the present family seems in reality to distinguish itself pretty well. Several well marked types are comprised within the family, and this has rendered it necessary to establish rather a great number of genera, some of which have been formerly combined within the genus *Doropygus* of Thorell. Seven different genera belonging to the present family will be treated of in the sequel, and 3 other genera, not represented in the Fauna of Norway, are also evidently referable to the same family, viz., *Goniodelphys* Buchholtz, *Doroixys* Kerschner, and *Bonnierilla* Canu. The family thus comprises at present no less than 10 genera.

As to habits, the forms comprised within this family agree with the *Notodelphyidæ* in so far that they, like the latter, lead a symbiotic existence within the branchial cavity of several kinds of Ascidians. Their mobility is however far inferior, and they seem indeed in most cases to be wholly devoid of swimming power, being only enabled to change their place within the branchial cavity of their hosts by a slow ramping motion. This applies not only to the females, but also to the males, with perhaps a single exception, viz., *Doropygopsis longicauda* (see farther below).

Gen. 3. *Doropygus*, Thorell, 1859.

Generic Characters.—Body in female distinctly compressed, and exhibiting a pronounced ventral curvature; that in male more cylindrical in shape, and gradually tapered behind. Incubatory pouch very large and gibbously prominent behind. Tail narrow cylindric in form, and more or less abruptly bent downwards, last segment deeply cleft behind. Caudal rami more or less produced, narrowed distally, and only provided with very small rudiments of setæ. Anterior antennæ of the very same structure in the 2 sexes, being composed of 8 or 9 joints, the first 2 of which are very broad and compressed. Posterior antennæ scarcely shorter than the anterior, but much narrower, and highly chitinised, tapering distally, and armed at the tip with an apparently immobile claw. Mandibular palp with the outer ramus well developed, narrowly exerted at the end, and divided into 4 more or less distinctly defined joints. Endopodal part of maxillæ with a distinctly defined terminal joint. Anterior maxillipeds with the terminal part bi-or 3-articulate. Posterior maxillipeds more or less reduced. The 4 anterior pairs of legs with the basal part very thick and muscular, rami generally 3-articulate and of equal size. Last pair of legs with the proximal joint sub-quadrangular in form and not produced outside to any distinctly defined process, distal joint more or less slender, sub-linear in shape.

Remarks.—The present genus, being that established at the earliest date, must of course be regarded as the type of the family *Doropygidae*. It is here taken in a more restricted sense than done by Thorell and most other authors, some of the species referred by them to this genus having turned out to represent types of nearly allied genera. In the restriction here adopted, the genus as yet comprises 6 species, 3 of which have been found on the Norwegian coast and will be described below.

9. *Doropygus pulex*, Thorell.

(Pl. XX).

Doropygus pulex, Thorell, l. c. p. 46, Pl. VI, 8.

Syn: *Doropygus pullus*, Buchholtz.

Specific Characters.—*Female.* Body comparatively short and stout, with the anterior division, seen laterally, oblong oval in form and somewhat widening distally. Incubatory pouch gently curved and greatly prominent behind, its posterior part being somewhat exerted and narrowly rounded at the end.

Tail about equalling in length half the anterior division, and apparently composed of 5 segments, the last one cleft by a deep angular insision into 2 diverging triangular lappets, carrying on the tips the caudal rami. The latter nearly twice as long as the anal segment, and of a narrow blad-like shape, tapering distally, and terminating in an obtuse point, on which slight rudiments of 3 or 4 setæ may be observed. Eye very small, but easily observable in the living animal. Anterior antennæ scarcely attaining the length of the head, and apparently composed of 8 joints clothed with comparatively short setæ, some of the joints exhibiting slight traces of a sub-division, the first 2 much larger than the others. Posterior antennæ rather slender and quite smooth, except at the tip, which is armed with a very strong curved claw accompanied by a small bristle. Endopodal part of maxillæ with 3 setæ inside the base; terminal joint comparatively small, quadrangular in form, and only provided with 2 setæ. Anterior maxillipeds with the terminal part well developed, and composed of 3 well defined joints. Posterior maxillipeds much reduced in size, each forming an undivided oval lamella clothed inside and at the tip with a number of thickish plumose setæ. The 4 anterior pairs of legs with the rami comparatively short and broad, the inner one in 1st pair distinctly 3-articulate, in the succeeding pairs however only biarticulate, the 2 outer joints being confluent. Last pair of legs with the distal joint somewhat cultriform in shape, and armed outside near the end with 3 small denticles, apex blunted and, as usual, provided with a spine and a very thin bristle.

Male of very small size, as compared with the female, and having the body gradually tapered behind, though curved in a similar manner. Structure of the several appendages much as in female.

Body of female, when alive, rather pellucid, with a slight whitish gray hue, ripe ova in the incubatory pouch generally of a dark fuscous or violaceous colour.

Length of adult female attaining 3.80 mm.; that of male scarcely exceeding 1.50 mm.

Remarks.—The present species is the type of the genus *Doropygus*, and may be easily recognised by the characteristic shape of the incubatory pouch in the female. The form recorded by Buchholtz from the Mediterranean under the name of *D. pullus* is evidently identical with Thorell's species. On the other hand, are the figures given by Brady on Pl. XXVIII in his monograph scarcely referable to the present species, but more properly to an immature specimen of *D. porcicauda*.

Occurrence.—I have met with this form in many different places on the Norwegian coast, from the Christiania Fjord at least to the Trondhjem Fjord. It is found, often in considerable number, within the branchial cavity of several kinds of Ascidians. When loosened from its hold, the animal rests nearly immobile on the bottom, lying on the one or other side. Only from time to time it is seen slowly to bend its body and to move the antennæ and legs, without however thereby to be enabled to change its place in any perceptible manner.

Distribution.—Coast of Bohuslän (Thorell), British Isles (Brady), coast of France (Canu), Mediterranean (Buchholtz).

10. *Doropygus psyllus*, Thorell.

(Pl. XXI).

Doropygus psyllus, Thorell, l. c. p. 49, Pl. VII, 9.

Specific Characters.—*Female*. General form of the body rather like that in the preceding species, though perhaps still shorter and stouter. Incubatory pouch of very large size and quite evenly rounded behind. Tail scarcely attaining half the length of the anterior division, and, as usual, composed of 4 segments, the last of which, as in *D. pulex*, is cleft into 2 diverging triangular lappets. Caudal rami still more slender than in that species, otherwise of a very similar structure. Anterior antennæ composed of 9 well defined joints, the 1st of which is much the largest, occupying almost half the length of the antenna, 2nd joint much shorter but nearly as broad, and gibbously expanded in front, being armed with 2 short spines in addition to the setæ; the remaining part of the antenna abruptly much narrower and extending at an angle to the first 2 joints. Posterior antennæ very slender, exceeding in length the anterior ones, with the terminal joint considerably produced and somewhat curved, apical claw very small. Endopodal part of maxillæ with 4 setæ inside the base, terminal joint much larger than in *D. pulex* and of rounded oval form, being fringed with 6 plumose setæ. Anterior maxillipeds about as in *D. pulex*. Posterior maxillipeds however more fully developed, being composed of 2 well defined joints, distal joint however rather small, with 3 unequal setæ on the end. 1st pair of legs about as in *D. pulex*, the succeeding pairs however having both rami distinctly 3-articulate and rather slender, joints of outer ramus remarkably produced at the end outside. Last pair of legs with the distal joint comparatively narrower than in *D. pulex*, sublinear in form,

with the outer edge smooth, the inner clothed with a few bundles of small spinules.

Body in the living animal, according to Thorell, of a whitish grey hue, with the ripe ova fuscous green.

Length of adult female 2.30 mm.

Male unknown.

Remarks.—This form exhibits in its general appearance a rather close resemblance to *D. pulex*, and may indeed at the first sight easily be confounded with it. It is however of much inferior size, and, on a closer inspection, is found to differ conspicuously in the shape of the incubatory pouch. In the structural details, moreover, several well-marked differences are found, as indicated in the above diagnosis. The form recorded by Brady as *D. Normani*, seem to be very closely allied to the present species, but, to judge from the figures given by that author, it is scarcely the same species.

Occurrence.—Some few female specimens of this form were selected from material collected, many year ago, on the western coast of Norway, the exact locality not being ascertained.

Distribution.—Coast of Bohuslän (Thorell), coast of France (Canu).

11. *Doropygus porcicauda*, Brady.

(Pl. XXII).

Doropygus porcicauda, Brady, Monogr. British Copepoda, Vol. I, p. 138, Pl. XXVII, figs. 1—9, Pl. XXXIII, figs. 14—16.

Specific Characters.—*Female.* Body comparatively somewhat more slender than in the 2 preceding species, with the hind edge of the head and the 3 anterior trunkal segments elevated on each side dorsally to a small knob-like prominence. Incubatory pouch of very large size and greatly prominent behind, extending far beyond the limits of the tail, and terminating in an obtuse point. Tail unusually short, scarcely exceeding in length $\frac{1}{3}$ of the anterior division, and composed of 4 segments, the penultimate of which exhibits a slight indication to a subdivision; last segment not expanded distally, though, as in the 2 preceding species, deeply cleft behind in the middle. Caudal rami of rather a peculiar shape, being greatly prolonged and terminating in a very flexible thin lash, which may be curled up in a remarkable manner, as indicated in the figure given by Brady. Anterior antennæ rather elongated, being fully as long as the head, and composed of 9 well defined joints, the first 2 of which, as usual, are much the largest, though combined scarcely exceeding half the

length of the remaining very slender part of the antenna; 1st joint provided near the end with 3 remarkably strong and densely plumose setæ, 2nd joint with 2 short spines in addition to the setæ. Posterior antennæ resembling in structure those in *D. psyllus*. Endopodal part of maxillæ with the terminal joint subfusiform in shape, and fringed inside with 5 setæ gradually increasing in length distally, its tip somewhat exerted and carrying 2 subequal setæ. Anterior maxillipeds with the terminal part comparatively short and only composed of 2 joints. Posterior maxillipeds distinctly biarticulate, distal joint slightly constricted near the end. The 4 anterior pairs of legs with both rami distinctly 3-articulate, and gradually increasing in length behind, those of 4th pair remarkably long and narrow, with most of the setæ obliterated. Last pair of legs of a similar structure to those in the 2 preceding species, but of comparatively smaller size.

Colour of the living animal not yet ascertained.

Length of the specimen examined 3.40 mm.

Male unknown.

Remarks.—The present species may at once be recognised by the peculiar structure of the caudal rami, a character which indeed has given rise to the specific name proposed by Brady. The shape of the incubatory pouch is also rather characteristic, and some peculiarities are moreover found in the structural details, as indicated in the above diagnosis.

Occurrence.—A solitary female specimen only of this distinct species has as yet come under my notice. It was obtained, many years ago, at Hvalør outside the Christiania Fjord, and, as far as I remember it, was taken from the branchial cavity of a *Corella parallellogramma*.

Distribution.—British Isles (Brady).

Gen. 4. **Doropygopsis**, G. O. Sars, n.

Generic Characters.—Body comparatively more slender than in *Doropygus*, distinctly curved in female, straight in male. Incubatory pouch of moderate size. Tail composed in both sexes of 4 segments, the last not cleft behind. Caudal rami slender and narrow, with the apical setæ less rudimentary than in *Doropygus*. Anterior antennæ in female of a similar structure to that in the said genus; those in male however conspicuously transformed and distinctly prehensile. Posterior antennæ rather unlike those in *Doropygus*, and more resembling in structure those in the *Notodelphyidæ*. Oral parts well developed

in both sexes. Mandibular palp with the outer ramus shorter than the inner, forming a rather broad undivided plate fringed with the usual number of strong plumose setæ. Endopodal part of maxillæ with the terminal joint distinctly subdivided. Posterior maxillipeds composed of 3 well defined joints. The 4 anterior pairs of legs more perfectly developed than in *Doropygus* and apparently adapted for swimming, at least in the male; both rami 3-articulate. Last pair of legs built on the same type as in *Doropygus*.

Remarks.—This new genus is established, to include the form recorded by Aurivillius under the name of *Doropygus longicauda*. A closer examination of this form, and more particularly of the hitherto unknown male sex, has led me to the conclusion, that it more properly should be separated generically from *Doropygus*. The genus, though undoubtedly referable to the present family, exhibits a closer affinity to the *Notodelphyidæ*, than does any of the other genera here treated of, and appears indeed in some respects to form a connecting link between these 2 families.

12. *Doropygopsis longicauda*, (Aurivillius).

(Pl. XXIII).

Doropygus longicauda, Aurivillius, Bidrag til kännedomen om Krustaceer, som lefva hos Mollusker och Tunicater, p. 18, Pl. III.

Specific Characters.—*Female.* Body rather slender and only slightly compressed, exhibiting the usual ventral curvature. Head comparatively large, fully attaining the length of the 2 succeeding segments combined, with the lateral edges evenly curved in front, but almost straight in the middle; rostral prominence very small. Incubatory pouch well developed and rather prominent behind, with the extremity quite evenly rounded. Tail about half the length of the anterior division, and narrow cylindrical in form, last segment smaller than the others and nearly transversely truncated at the end. Caudal rami slender and narrow about twice the length of the anal segment, and provided at the obtusely pointed tip with 4 well defined, though comparatively small setæ; 2 minute bristles moreover present on each ramus the one attached to the outer edge at a short distance from the base, the other occurring inside nearer the apex and somewhat dorsally. Anterior antennæ shorter than the head and, as usual, deflexed, being composed of 9 well defined joints rather densely clothed with setæ; 1st joint with 2 very strong plumose setæ near the end; 2nd joint without any spines. Posterior antennæ with the basal and terminal parts sharply marked

off from each other, the former provided at the end of the 1st joint behind with a well developed plumose seta; terminal part a little shorter than the basal one, and provided outside, at some distance from the end, with 2 small juxtaposed setæ; apical claw of moderate size and accompanied by 2 curved bristles. Endopodal part of maxillæ with the terminal joint rather produced and fringed inside with 3 setæ, its outermost part cut off as a well defined apical joint carrying 4 setæ. Posterior maxillipeds with the middle joint well defined, and armed inside with a curved spiniform seta; terminal joint comparatively small and fringed with 4 setæ. The 4 anterior pairs of legs with the rami rather slender and somewhat unequal in size, the inner one being the longer, especially in 1st pair; spines of outer ramus very thin, almost setiform. Last pair of legs with the proximal joint very broad at the base; distal joint slender, sublinear, with the edges somewhat waved and clothed with small hairs and spinules.

Male of smaller size than female, and rather unlike it in its general appearance, the body being very slender, attenuated behind, and quite straight, with the 1st trunkal segment united with the head. Caudal rami still more slender than in female, and having the apical setæ more fully developed and distinctly ciliated. Anterior antennæ built on the very same type as in the male *Notodelphyidæ*, being composed of 10 joints, the last 2 of which are much larger than in female and together form a movable terminal part admitting to be impinged against the preceding part of the antenna. The remaining appendages of exactly same structure as in female.

Body of female, in the living state, of an uniform light reddish hue; ripe ova of a similar, though somewhat darker colour.

Length of adult female attaining 4.50 mm., of male 2.40 mm.

Remarks.—The above described form, the only species as yet known of the present genus, may be easily distinguished from the other *Doropygidæ* by its comparatively slender and less compressed body, as also by the unusually long and narrow caudal rami. The female is at once recognised as a true *Doropygid* by the characteristic ventral curvature of the body and the gibbously prominent incubatory pouch. The male, on the other hand, may on the first sight easily be taken for a *Notodelphyid*, exhibiting, as it does, a much similar form of the body and a similar transformation of the anterior antennæ.

Occurrence.—Several specimens of this form have been collected by me at different times and in different places, both on the south and west coasts of Norway. Most of the specimens were taken from the branchial cavity of

Phallusia obliqua. The animal, when alive, is rather more mobile than the other Doropygidæ, and even females encumbered with ripe ova are seen, when loosened from their holds, moving to some extent freely in the water, though in a rather clumsy manner. The males are much more agile and are scarcely in this respect overmatched by the Notodelphyidæ. Indeed, one of the male specimens obtained was found out of his host, swimming quickly about together with other free-living Copepoda.

Distribution.—Coast of Bohuslän (Aurivillius).

Gen. 5. *Doropygella*, G. O. Sars, n.

Generic Characters.—Body comparatively short and stout, being scarcely at all compressed. Head remarkably large and broad, produced in front to a deflexed conical rostrum. Incubatory pouch not much prominent. Tail composed in both sexes of 4 segments, the last of which is transversely truncated behind. Caudal rami quite simple, terminating in a blunt point, and without any distinctly defined setæ. Anterior antennæ short and deflexed, with the proximal joints very broad and compressed; those in male not transformed. Posterior antennæ strongly built and nearly smooth, apical claw well developed. Mandibular palp with the outer ramus undivided. Endopodal part of maxillæ with a distinctly defined terminal joint extending outwards along the exopodal lamella. Anterior maxillipeds rather robuste, but with the terminal part poorly developed. Posterior maxillipeds distinctly 3-articulate. The 4 anterior pairs of legs of comparatively small size and not adapted for swimming, basal part broad and flattened, rami in all the pairs 3-articulate, but rather short, with the setæ poorly developed. Last pair of legs small, with the distal joint scale-like.

Remarks.—This genus also is founded upon a single species detected by Aurivillius and referred by him to the genus *Doropygus*. Several peculiarities found in this species, both as regards the outward appearance of the body and the structure of some of the appendages, have however led me to the conclusion, that it more properly ought to be regarded as the type of a separate genus.

13. *Doropygella Thorelli*, (Aurivillius).

(Pl. XXIV)

Doropygus Thorelli, Aurivillius, l. c. p. 45, Pl. V.

Specific Characters.—*Female*. Body of a rather short and clumsy form, exhibiting the usual ventral curvature. Head unusually large and expanded, exceeding both in height and width the adjoining part of the trunk, seen

dorsally almost semicircular in outline; rostral prominence terminating in a knob-like point. The 3 succeeding segments gradually increasing in size, with the lateral parts not extant. Incubatory pouch subquadrangular in shape and scarcely dilated behind, with the extremity transversely truncated and slightly overlapping the base of the tail. The latter about half the length of the anterior division, with the last segment considerably larger than the preceding one and not dilated distally. Caudal rami comparatively short, scarcely exceeding half the length of the anal segment, and terminating in a blunt point. Eye apparently absent. Anterior antennæ scarcely attaining half the length of the head, and composed of 8 joints, the 3 or 4 proximal ones lamellarly expanded, the 4 outer joints abruptly much narrower. Posterior antennæ with the middle joint somewhat dilated; apical claw well developed and accompanied by 2 very small bristles. Endopodal part of maxillæ with 3 setæ inside the base, terminal joint somewhat fusiform in shape and edged with 6 setæ, 2 of which issue from the strongly convex inner edge, the 4 others from the tip. Anterior maxillipeds with the claw-like spine issuing from the 2nd basal joint very strong, terminal part short, biarticulate. Posterior maxillipeds with the middle joint quite unarmed, terminal joint carrying 3 subequal setæ. The 4 anterior pairs of legs somewhat diminishing in size behind, and wanting the usual plumose seta inside the 1st basal segment; outer ramus in all the pairs larger than the inner and armed outside with strong spines. Last pair of legs with the proximal joint rather broad at the base and provided at the end outside with the usual small bristle; distal joint scale-like, with the outer edge boldly curved, tip provided with a single small bristle.

Male resembling in shape the males of most other Doropygidæ, being however easily recognisable by the large size of the head.

Body in the living animal of a uniform whitish colour.

Length of adult female 2.10 mm., of male 1.50 mm.

Remarks.—The present form may be easily recognised from the other known Doropygidæ by its short and clumsy body, and more particularly by the unusual development of the head and the characteristic shape of the incubatory pouch.

Occurrence.—I have taken this form not unfrequently in several places, both of the south and west coasts of Norway. It is generally found within the branchial cavity of *Phallusia obliqua*, more rarely in that of other kinds of Ascidians. The animal is very slow in its movements, and is quite unable to move freely in the water.

Distribution.—Coast of Bohuslän (Aurivillius).

Gen. 6. **Pachypygus**, G. O. Sars, n.

Generic Characters.—Body of female very stout and compact, and pronouncedly compressed, with the back boldly curved; that of male, as usual, more slender and gradually attenuated behind. Head of moderate size and rather deep. Incubatory pouch large and prominent, more or less exerted at the end. Tail composed in both sexes of 4 segments, the last of which is the smallest and peculiarly produced at the end both dorsally and ventrally. Caudal rami claw-like- curved downwards, and tipped with a stout spine accompanied by a number of smaller denticles. Anterior antennæ comparatively short and stout, with the number of joints somewhat reduced; those in male not transformed. Posterior antennæ quite smooth, terminating in a well developed claw. Oral parts on the whole built on the same type as in the preceding genus. The 4 anterior pairs of legs not adapted for swimming, both rami 3-articulate and rather unequal, the outer one being the larger, and having the setæ more or less obliterated. Last pair of legs resembling in shape those in *Doropygus*.

Remarks.—This genus is established to include the *Doropygus gibber* of Thorell. The generic difference of this form from *Doropygus* was indeed recognised by Giesbrecht; but I am not prepared to consent with him in referring this species to the genus *Notopterophorus* Costa, as it differs very conspicuously not only in the character from which that genus has derived its name, but also in some of the structural details, as seen from the diagnoses here given of the 2 genera. The genus *Goniodelphys* of Buchholtz seems to come very near to the present genus, and should perhaps be united with it.

14. **Pachypygus gibber**, (Thorell).

(Pl. XXV)

Doropygus gibber, Thorell, l. c. p. 52, Pl. VIII, 11.

Specific Characters.—*Female.* Body of a very robust and compact appearance, and strongly curved ventrally, with the back boldly arched and the tail more or less bent below the anterior division. Head comparatively short, but rather deep, and produced in front to a short and obtuse rostral prominence. The 3 succeeding segments rapidly increasing in size, the 3rd being exceedingly large and deep; 1st trunkal segment only visible in its dorsal part, being otherwise concealed by the adjoining segments. Incubatory pouch large and prominent, with the hind extremity somewhat deflexed and

angular at the tip, the angle being more prominent in young specimens; enclosed ova very numerous and densely accumulated. Tail not nearly attaining half the length of the anterior division, and slightly tapered distally; last segment rather short and remarkably produced at the end both dorsally and ventrally. Caudal rami of rather a peculiar appearance, forming 2 somewhat claw-like and very mobile lamellæ curving downwards, each armed at the narrowly exerted tip with a stout spine accompanied by 2 or 3 smaller denticles. Anterior antennæ comparatively short and stout, being only composed of 7 joints clothed with rather small curved setæ, the first 2 joints very large and expanded, occupying combined $\frac{2}{3}$ of the length of the antenna. Posterior antennæ strongly chitinated, with the terminal joint comparatively short, not even attaining the length of the middle one. Endopodal part of maxillæ with 3 somewhat unequal setæ inside the base; terminal joint extending straight outwards, and fringed on the inner edge with 4 very small setæ, at the somewhat exerted knob-like tip with 3 considerably longer setæ. Posterior maxillipeds rather fully developed, with all the joints setiferous, the last one exhibiting traces of a subdivision. 1st pair of legs with the rami nearly equal-sized, the 3 succeeding pairs however having the outer ramus considerably larger than the inner, with most of the setæ obliterated and replaced by tufts of small spinules. Last pair of legs with the distal joint cultriform, and armed on the inner edge with small denticles.

Body in the living animal of a whitish gray hue, with the ripe ova dark fuscous green.

Length of adult female attaining 5.00 mm.

Remarks.—This is much the largest of the known Doropygidæ, and moreover easily recognisable by its unusually robust body. The male of this species has been well described and figured by Canu.

Occurrence.—I have met with this form occasionally in several places, both on the south and west coasts of Norway. It is found in several kinds of Ascidians, most frequently perhaps in *Phallusia mentula*. The mobility of the living animal is very restricted.

Distribution.—Coast of Bohuslän (Thorell), British Isles (Norman, Scott), coast of France (Canu), Mediterranean (Buchholtz).

Gen. 7. *Notopterophorus*, Costa, 1852.

Generic Characters.—Body of female strongly curved ventrally, with the free segments of trunk sharply defined and produced dorsally to more or less

prominent wing-like expansions in some instances divided into soft filiform processes; that of male simple cylindric, without any dorsal expansions. Incubatory pouch of moderate size and more or less produced at the end. Tail composed in both sexes of 4 segments, the last of which is simple, truncate at the end. Caudal rami forming 2 compressed pieces curving downwards and each armed on the narrowly truncated end with 4 subequal hooks. Anterior antennæ alike in the 2 sexes, and comparatively more slender than in *Pachypygus*. Posterior antennæ and oral parts built on a similar type to that in the said genus. The 4 anterior pairs of legs however conspicuously differing in the structure of the inner ramus, which in all the pairs is only composed of 2 joints. Last pair of legs comparatively small with the distal joint narrow linear in form.

Remarks.—This genus was established as early as the year 1852 by Costa, and is chiefly characterised by the peculiar wing-like expansions of the free trunkal segments in the female, these expansions attaining in some instances quite an extraordinary development. Otherwise it comes very near to the genus *Pachypygus*, yet differing from it also somewhat in the structure of the legs and that of the caudal rami. Several species of this genus have been recorded by different authors, and chiefly distinguished by the different development of the above-mentioned expansions. As however these expansions appear to be subjected to some variation, the limits between the several species are not always easy to fix exactly. Three Norwegian species referable to this genus will be described below.

15. *Notopterophorus auritus*, (Thorell).

(Pl. XXVI)

Doropygus auritus, Thorell, l. c. p. 50, ll. VII, Pl. VIII, 10.

Specific Characters.—*Female.* Body moderately slender and gently curved, with the free segments of trunk sharply defined by deep constrictions; wing-like expansions only slightly prominent and quite evenly rounded at the end, those of 1st segment confluent, the others well defined, though contiguous at the base anteriorly. Incubatory pouch not very large, irregularly quadrangular in outline, and terminating behind in an obtuse point. Tail about half the length of the anterior division, and slightly tapering distally, with the last segment the smallest. Caudal rami slightly curved and gradually attenuated distally, with a small bristle somewhat beyond the middle of the upper edge; tip narrowly truncated and armed with 4 hooks of equal size. Anterior an-

tennæ somewhat shorter than the head, and composed of 9 well defined joints, the first 2 of which, as usual, are the largest, though combined not much longer than the remaining part of the antenna. Posterior antennæ rather stout, with the terminal joint much shorter than the middle one; apical claw very strong. Mandibular palp with the outer ramus very short and broad, undivided. Endopodal part of maxillæ with 4 setæ inside the base, one of them much larger than the others; terminal joint fringed inside with 4 small setæ and carrying on the slightly exerted tip 3 somewhat longer setæ. Anterior maxillipeds with the terminal part rather slender, 3-articulate, middle joint considerably longer than the others. Posterior maxillipeds distinctly 3-articulate, with the last joint simple, fringed with 4 setæ. 1st pair of legs with the rami not much different in length, but rather unlike in structure, the inner ones being, as in the 3 succeeding pairs, only composed of 2 joints, the distal one much the larger and clothed with unusually long and slender setæ. Outer ramus of the 3 succeeding pairs longer than the inner and tapered distally, with the 1st joint very large, setæ much reduced, being wholly absent in the 4th pair. Last pair of legs with the distal joint narrow linear in form and provided on both edges with small spinules.

Male much smaller than female and without any traces of dorsal expansions.

Body of female, in the living state, of a pale yellowish brown hue, with the ripe ova fuscous green.

Length of adult female attaining 4.20 mm.; that of male scarcely exceeding 1.40 mm.

Remarks.—This form was described in the year 1859 by Thorell and referred by him to the genus *Doropygus*. In a note to his description he has however alluded to its apparent relationship to the genus *Notopterophorus* of Costa. Indeed, it ought evidently to be referred to that genus, though the dorsal expansions of the body are far less conspicuous than in the other known species.

Occurrence.—The present form is not seldom found in large Ascidians of different kinds. I have noted it from many places on the Norwegian coast, from the Christiania Fjord at least to the Trondhjem Fjord. Like most other Doropygidæ, it is very slow in its movements.

Distribution.—Coast of Bohuslän (Thorell), British Isles (Norman & Scott).

16. *Notopterophorus papilio*, Hesse.

(Pl. XXVII).

Notopterophorus papilio, Hesse, Ann. Scienc. Nat., ser. 5, Vol. 1, p. 338, Pl. XI, figs. 1—13.

Specific Characters.—*Female.* Body comparatively more slender than in the preceding species and generally more strongly curved, being moreover highly distinguished by the extraordinary development of the wing-like expansions, which are very delicate, hyaline, and divided at the end into soft threadlike processes. The number of these expansions is 6 in all, the 4 middle ones being arranged in pairs on the 2nd and 3rd trunkal segments, the other 2 forming median plates issuing the one from the 1st trunkal segment, the other from the end of the incubatory pouch. Both these median expansions are somewhat spatulate in form and divided at the end into 3 threadlike processes, whereas only 2 such processes occur on each of the paired expansions. Structure of the caudal rami and of the several limbs almost exactly as in the preceding species.

Male of very small size, and exhibiting an appearance rather unlike that in female, being wholly devoid of any dorsal expansions, and resembling in shape the males of most other Doropygids.

Body of female, in the living state, semipellucid, of a light yellowish gray hue, with the ovarian tubes and the ripe ova dark fuscous in colour.

Length of adult female attaining 4.30 mm.; that of male scarcely exceeding 1.20 mm.

Remarks.—The present species exhibits a most peculiar appearance by the strongly prominent wing-like expansions surrounding the back of the body and extending in different directions. Some variability of these expansions may however be found to occur, and in younger specimens they are, as a rule, much smaller than in fully adults, though always, unlike what is the case in *N. auritus* and *elongatus*, distinctly divided at the end into well-marked threadlike processes.

Occurrence.—I have only met with this remarkable form in a single locality, viz., at Moldøen, west coast of Norway. It was found occasionally in the branchial cavity of large specimens of *Phallusia mentula*. Most of the specimens obtained were of the female sex; but on a closer examination of the collected material, also some few male specimens were detected, one of them still attached to the back of a young female by the aid of his rather powerfully developed posterior antennæ.

Distribution.—Coast of France (Hesse), British Isles (Brady).

17. *Notopterophorus micropterus*, G. O. Sars, n. sp.

(Pl. XXVIII. 1.)

Specific Characters.—*Female.* Body comparatively more robust than in *N. papilio*, and more resembling in shape that of *N. auritus*, being gently curved, with the segments very sharply marked off from each other. Wing-like expansions much reduced in size and conspicuously differing in shape from those in both the said species. The foremost expansion, issuing from the 1st trunkal segment, very slight, hood-like, with the edge entire, the 4 succeeding ones each exerted behind in a single thread-like point, the hindmost expansion, issuing from the end of the incubatory pouch, likewise simple, being exerted to a narrow point somewhat curved downwards. Structure of the several appendages scarcely differing from that in the 2 preceding species.

Colour of the living animal not yet ascertained.

Length of adult female 4.10 mm.

Remarks.—Though this form looks very different from *N. papilio*, as described and figured here, I am by no means fully convinced on its real specific validity, and indeed I do not regard it as impossible, that on a closer investigation it might turn out to represent only a peculiar variety of that species. As I however have not found any decided transition between them, I have found it advisable provisionally to record it as a separate species.

Occurrence.—Two female specimens only of this form have as yet come under my notice. They were obtained in the same locality as the preceding species.

Gen. 8. *Gunentophorus*, Costa, 1843.

Syn. *Sphæronotus*, Claus.

Generic Characters.—Trunkal part of the body in female greatly inflated, with the segments partly confluent, to form the large and prominent incubatory pouch, the cavity of which is prolonged anteriorly over the 2nd and 3rd segments. Head procumbent and well defined from the 1st trunkal segment, terminating in a blunt rostral prominence. Tail nearly straight and only composed of 3 distinctly defined segments. Caudal rami curved outwards and armed at the tip with small denticles. Anterior antennæ very short and compressed, with the joints imperfectly defined. Posterior antennæ distinctly prehensile. Mandibles well developed. Maxillæ with the endopodal part transversally truncated and without any terminal joint. Posterior maxillipeds much reduced, uniarticulate.

1st pair of legs very unlike the others and closely applied to the oral parts, both rami 3-articulate and provided with long plumose setæ. The 3 succeeding pairs of legs apparently immobile and without any armature whatever; outer ramus elongate, 3-articulate, inner very small and peculiarly contorted. 5th pair of legs apparently absent.

Remarks.—This is a very anomalous genus, exhibiting some rather extraneous characters. Yet in some respects, and more particularly in the peculiar composition of the incubatory pouch, it shows an unmistakable relationship to the genus *Bonnierilla* Canu, which is a true member of the present family. The genus as yet only comprises a single species, to be described below.

18. *Gunentophorus globularis*, Costa.

(Pl. XXVIII, 2)

Gunentophorus globularis, Costà, Fauna del regno di Napoli. Entomostraca, Pl. II.

Syn.: *Sphæronotus* Thorelli, Claus.

Specific Characters.—*Female.* Body comparatively rather robuste, with the anterior division distinctly curved, the posterior straight. Head not very deep, with the lateral edges scarcely at all curved, and terminating in front in an obtuse corner. 1st trunkal segment short and narrow; the 3 succeeding segments wholly confluent dorsally, to form the greatly prominent, almost hemispherical incubatory pouch; last trunkal segment well defined in its posterior part. Tail considerably exceeding half the length of the anterior division, and cylindric in form, though slightly tapered distally, 1st segment much the largest and a little protuberant below at the base, last segment exhibiting dorsally, somewhat beyond the middle, a slight transverse suture indicating a subdivision of the segment. Caudal rami comparatively small, slightly tapered, and abruptly bent outwards, being armed on the tip with a few very small denticles and on the outer edge, at some distance from the end, with a minute bristle. Eye imperfectly developed, without any lenses, and only represented by an irregular patch of a light yellowish red pigment. Anterior antennæ very short and stout, subtriangular in outline, and only clothed with a few very small bristles, joints imperfectly defined and apparently 6 or 7 in number. Posterior antennæ strongly chitinised and rather powerful, with the terminal joint comparatively short and somewhat tapered distally, apical claw well developed. Mandibular palp with the inner ramus shorter than the outer and less perfectly subdivided. Maxillæ with 4 short, but densely plumose setæ

on the transversely truncated end of the endopodal part. Anterior maxillipeds with the terminal part very short, uniarticulate. Posterior maxillipeds forming each an oval undivided lamella clothed inside and at the tip with a number of thickish plumose setæ. 1st pair of legs with the rami of about equal size, the outer one exhibiting only very slight traces of spines outside, its terminal joint of a somewhat irregular shape, being expanded, inside the insertions of the setæ, to a rounded lobe edged with 3 short denticles. The 3 succeeding pairs of legs much longer than the 1st, and of a very different structure, being apparently quite immobile, as only very slight traces of muscular bands are detected within them; outer ramus considerably produced and conically tapered, inner one extremely small, being composed of a short basal joint followed by a narrow, peculiarly twisted terminal piece, which in the 4th pair is simple, but in the 2 preceding pairs divided by 2 successive circular crests as it were in 3 joints. Of a 5th pair of legs not the slightest trace could be detected in the specimens examined.

Body in the living animal of a pale yellowish grey colour, with a slight bluish tinge; ovarial tubes and ripe ova of a somewhat darker violaceous hue.

Length of adult female attaining nearly 5 mm.

Male unknown.

Remarks. The present form is easily recognisable from any of the other Doropygidæ, both as regards its outward appearance and the structure of the several appendages. The large size of the Norwegian specimens is very remarkable, and could lead to the suggestion that they belonged to a species different from that observed in the Mediterranean and on the French coast.¹⁾ As however no other reliable difference could be detected to distinguish the Norwegian form, I have not felt justified to separate it specifically. The *Sphæronotus Thorelli* of Claus is evidently identical with Costa's species.

Occurrence.—Some few female specimens of this remarkable form were obtained, many years ago, from large specimens of *Phallusia mentula* taken in the upper part of the Trondhjem Fjord.

Distribution.—Mediterranean (Costa), coast of France (Canu), coast of Bohuslän (Aurivillius).

¹⁾ Canu gives the length of the body to only 2.50 mm.

Gen. 9. **Botachus**, Thorell, 1859.

Generic Characters.—Body of female narrow, sub-cylindrical in shape, with the matrical part remarkably elongate and the incubatory pouch only slightly prominent. Tail short, deflexed, and composed of 4 segments, the last of which is very short and conspicuously produced ventrally. Caudal rami short, lamelliform, and armed at the end with strong claw-like spines. Anterior antennæ comparatively slender, attenuated, and rather densely clothed with setæ. Posterior antennæ with a well developed plumose seta outside the basal part, apical claw rather strong. Mandibular palp with the inner ramus undivided, outer one narrow, sabre-like. Endopodal part of maxillæ with a well defined terminal joint. Anterior maxillipeds with the terminal part well developed, 3-articulate. Posterior maxillipeds small, uniarticulate. The 4 anterior pairs of legs comparatively slender, but not adapted for swimming, both rami 3-articulate, the outer one armed at the tip and outside with very slender spines, setæ on both rami much reduced in number. Last pair of legs very small and rudimentary, resembling somewhat in structure those in the *Notodelphyidæ*.

Remarks.—This is also a very distinct genus, though somewhat less anomalous than *Gunenterophorus*, and more agreeing with the usual Doropygian type. In addition to the typical form described below, another nearly allied species has been recorded by Buchholtz from the Mediterranean under the name of *B. fusiformis*.

19. **Botachus cylindratus**, Thorell.

Botachus cylindratus, Thorell, l. c. p. 55, Pl. IX, 12.

Specific Characters.—*Female.* Body extremely slender and narrow, with the anterior division very little dilated and somewhat tapered anteriorly. Head gradually contracted in front and terminating in a nearly horizontal, obtusely rounded rostral plate. 1st trunkal segment very small and partly concealed by the rounded lateral corner of the head. The 2 succeeding segments well defined and slightly increasing in size behind. Matrical part of body, composed of the last 2 coalesced trunkal segments, almost occupying half the length of the body, and of oblong form, with the dorsal face only slightly vaulted and encompassing the comparatively narrow incubatory cavity. Tail very short, scarcely attaining in length $\frac{1}{3}$ of the anterior division, and more or less abruptly bent downwards; last segment very small, but produced below to a rather prominent bifurcate lappet. Caudal rami forming 2 vertically placed

lamellæ of sub-quadrangular shape, and armed at the upper corner with 2 strong claw-shaped spines, lower corner produced to an acute prominence accompanied below by a slender bristle. Anterior antennæ angularly bent in the middle, and composed of 9 well defined joints, the first 3 of which are much larger than the others and have the setæ distinctly ciliated. Posterior antennæ rather strongly built and attached to the head by a short and thick basal joint, terminal joint longer than the preceding one and finely ciliated on both edges, apical claw only slightly curved and accompanied by 2 small bristles. Mandibular palp with the basal part narrower than usual, inner ramus lamelliform, undivided, outer ramus more slender and provided in its outer part with 5 setæ, the 2 outermost issuing from a small but well defined apical joint. Endopodal part of maxillæ with the terminal joint somewhat spatulate in form and provided at the end with 3 setæ. Anterior maxillipeds not particularly strong and gradually tapered distally. Posterior maxillipeds forming each an undivided oblong oval lamella clothed at the tip and inside with a number of partly ciliated setæ. The 4 anterior pairs of legs gradually somewhat increasing in length, 4th pair with the outer ramus considerably longer than the inner and having the terminal joint rather produced. Last pair of legs with the proximal joint produced outside to a conical process tipped with a slender bristle; distal joint very small and narrow, with a single apical seta.

Body in the living animal rather pellucid, of a whitish grey hue with the rather large ripe ova dark bluish or purplish.

Length of adult female 2.10 mm.

Male unknown.

Remarks.—The present form is at once distinguished from any of the other known Doropygidæ by its very slender and narrow body, the short and abruptly bent tail, and the shape of the incubatory pouch.

Occurrence.—I have met with this form not unfrequently in several places on the Norwegian coast. It is found in several kinds of Ascidians and, as observed by Thorell, almost exclusively between the lamellæ of the branchial sac, more or less firmly attached to these lamellæ by the aid of its powerful posterior antennæ. When loosened from its hold, the animal rests nearly motionless on the bottom, only a slight bending of the body being perceptible.

Distribution.—Coast of Bohuslän (Thorell), British Isles (Brady).

Fam. 3. Buproridæ.

Remarks.—This very distinct family, established by Thorell, only comprises as yet a single genus, the characters of which are given below.

Gen. 10. **Buprorus**, Thorell, 1859.

Generic Characters.—Body short and stout, unsegmented, and only composed of head and trunk, the tail being wholly obliterated or only present as a trifling rudiment. Ripe ova received into a roomy incubatory cavity formed by the dorsal and lateral walls of the trunk in almost its entire extent, Anterior antennæ short and stout, with the number of joints much reduced. Posterior antennæ not prehensile, the terminal joint being only provided with simple spines, none of which is unguiform. Oral parts of rather simple structure, though apparently well adapted for mastication. The 4 anterior pairs of legs poorly developed, with the rami short and stout, armed at the end with short spines, the outer one biarticulate, the inner one uniarticulate. Last pair of legs forming 2 simple conical prominences tipped with a few small spines.

Remarks.—This genus exhibits some very extraneous characters, by which it seems to distinguish itself very sharply from any of the other genera comprised within the present division of Copepoda, and Thorell was certainly quite right in regarding it as the type of a very distinct family. He was indeed of opinion that this family was even more distinct than his family *Ascidicolidæ*, which latter he merely regarded as a subfamily of the *Notodelphyidæ*. Yet, on a closer examination, it will be found, that the present genus agrees with those treated of in the preceding pages at least in one very essential character, viz., in the presence of an incubatory cavity for the reception of the ripe ova. Such a cavity, on the other hand, does not exist either in the *Ascidicolidæ* or in the other families treated of in the sequel, the ova pured out from the ovarial tubes being here, as in most other Copepoda, accumulated in free ovisacs appended to the body. The reception of the genus *Enterocola* within the family *Buproridæ*, as proposed by Brady, cannot therefore by any means be admitted. The present genus as yet only comprises a single species, to be described below.

20. *Buprorus Lovéni*, Thorell.

(Pl. XXX)

Buprorus Lovéni, Thorell, l. c. p. 63, Pl. X, 14.

Specific Characters.—*Female.* Body short and stout, bag-like, with the head subquadrate in form and somewhat exerted, not being however distinctly defined behind, rostral prominence short and obtuse at the tip. Trunk with the dorsal face rather strongly vaulted and almost gibbously prominent in front, seen dorsally, regularly oval or elliptical in outline. Eye woolly absent. Anterior antennæ about the length of the head, somewhat curved, and composed of only 3 distinctly defined joints clothed with comparatively short, partly spiniform setæ, middle joint much the largest, terminal joint abruptly much narrower and scarcely $\frac{1}{3}$ as long. Posterior antennæ 3-articulate, with the 1st joint about the length of the other 2 combined, and provided near the end anteriorly with a curved seta, the 2 outer joints firmly connected and forming with the 1st one a geniculate bend; middle joint armed outside with 3 strong spines, the outermost being accompanied by a slender seta; terminal joint shorter than the middle one and armed on the transversely truncated extremity with 3 unequal spines and a simple seta. Mandibles with the masticatory part not much expanded, but divided at the end into several sharply pointed teeth; palp quite rudimentary, being replaced by a single slender seta. Maxillæ with the masticatory lobe well developed and armed with strong spines, palp undivided, with 2 coarse spines at the tip and 2 juxtaposed setæ attached to a distinct ledge of the outer edge. Anterior maxillipeds composed of 3 joints, the 1st of which is rather large and broad, being provided at the end inside with a narrow cylindrical lobe tipped with 2 slender spines; 2nd joint produced inside to a quite similar bispinose lobe, 3rd joint very small and armed with 3 spines. Posterior maxillipeds undivided, lamellar, and fringed inside in its outer half with 4 spines, each terminating in a blunt point. The 4 anterior pairs of legs of essentially same structure, outer ramus somewhat larger than the inner one and having a short spine outside the 1st joint, distal joint obliquely truncated and fringed at the end with a row of 5 stout spines, inside which another row of somewhat more slender spines is seen, the number of these spines varying in the different legs; inner ramus in all the pairs provided at the end with 5 spines, one of which is attached to the outer edge near the tip. Last pair of legs imperfectly defined at the base, and armed at the narrowly exerted extremity with 4 short spines. Between these latter legs a small triangular prominence occurs con-

taining the anal orifice, and apparently representing a trifling rudiment of the tail.

Body in the living animal of an uniform whitish colour, with the rather large ova, contained within the incubatory cavity, of same colour, but more opaque.

Length of adult female 1.10 mm.

Male unknown.

Remarks.—The above-described peculiar form looks so very different from any of the other known Copepoda, that at the first sight even its reference to that order of Crustacea could be questioned. Indeed, in its outward appearance it more resembles some kinds of *mites*, especially the *Tardigrada*. On a closer examination however it is soon proved to be a true member of the present division of Copepoda, its extraneous appearance being the result of a close adaption to its sedentary life within Ascidians.

Occurrence.—I have found this peculiar form, often in considerable number, within the branchial cavity of different kinds of Ascidians, most frequently in *Phallusia obliqua*. It may however easily escape attention, on account of its small size and inconspicuous colour. The mobility of the animal is almost wholly lost, and the only token of life perceptible is a slight fumbling movement of the antennæ and legs. I have carefully looked over the numerous specimens collected, but have not succeeded in detecting even a single male among them.

Distribution.—Coast of Bohuslän (Thorell).

Fam. 4. Ascidicolidæ.

Remarks.—This family was established by Thorell, to include his genus *Ascidicola*, which indeed exhibits several well marked peculiarities distinguishing it very conspicuously from the other Notodelphyoida. As to the relation of this family to the other known families of the present division of Copepoda, it is evidently more sharply defined from the preceding families than from those treated of farther below, agreeing with the latter in one very essential character not recognised by Thorell, viz., in the absolute absence of any true incubatory cavity for the reception of the ripe ova. As the family only contains a single genus, it may suffice to give the characters of the latter.

Gen. 11. *Ascidicola*, Thorell, 1859.

Syn.: *Coeliacola*, Hesse.

Generic Characters.—Body of female slender, vermiform, with no sharp demarcation between the anterior and posterior divisions. Head well defined from trunk and terminating in a broad rostral plate. The last 2 trunkal segments in female not coalesced. Tail composed in both sexes of 4 segments. Caudal rami simple, not clawed at the end. Anterior antennæ short and thick, alike in both sexes. Posterior antennæ more slender and distinctly prehensile. Oral parts poorly developed and rather differing in structure from those in the other Notodelphyoida. The 4 anterior pairs of legs in female only adapted for crawling, the rami being very short, biarticulate, the inner one armed at the end with exceedingly long and slender spines; those in male of quite normal appearance and well adapted for swimming. Last pair of legs in female transformed to large lamellæ encompassing the genital region of the body, those in male very small and rudimentary. Ripe ova accumulated in 2 juxtaposed ovisacs appended to the dorsal face of the body and arched over by the transformed last pair of legs.

Remarks.—The present genus comprises as yet only a single species, to be described below.

21. *Ascidicola rosea*, Thorell.

(Pl. XXXI)

Ascidicola rosea, Thorell, l. c. p. 59, Pl. IX & X, 13.

Syn.: *Coeliacola setigera*, Hesse.

Specific Characters.—*Female*. Body almost perfectly cylindrical in form, the anterior division being very little broader than the posterior. Head slightly contracted in front, and terminating in a broadly rounded rostral plate. The first 2 trunkal segments imperfectly separated, the 2 succeeding ones however well defined. Last trunkal segment not clearly defined from the 1st caudal segment, both having the dorsal face somewhat hollowed to make an underlayer for the ovisacs. Tail very fully developed, exceeding in length the anterior division, and composed of 4 well defined segments gradually somewhat diminishing in size, the penultimate one having the ventral part of the hind edge remarkably thickened and densely clothed with small pricks, last segment transversely truncated at the end. Caudal rami a little shorter than the anal segment, and narrow linear in form, tip somewhat obliquely

truncated and carrying 3 spiniform setæ, the innermost but one much longer than the others, outer edge provided with a well defined seta about in the middle, and the dorsal face with another smaller seta at a short distance from the tip. Eye inconspicuous. Anterior antennæ short and thick, somewhat curved and terminating in a blunt point, each antenna composed of 6 joints densely clothed with comparatively short but rather strong curved setæ. Posterior antennæ rather broad at the base, but rapidly tapered distally, the first 2 joints each armed near the end anteriorly with a slender spine, terminal joint narrow, sublinear in form, and provided with a short spine in about the middle of the outer edge, tip armed with a comparatively small claw slightly curved at the end and accompanied by 2 or 3 small bristles. Anterior lip broad, almost trapezoid in form. Mandibles with the masticatory part divided at the end into several sharply pointed teeth, partly bi- or tri-partite; palp very small and apparently undivided with 3 or 4 short setæ at the tip and one considerably larger seta outside, apparently replacing the outer ramus. Maxillæ divided into 2 nearly equal triangular lobes, the inner one representing the masticatory lobe, the outer the palp, both edged with a number of partly spiniform setæ. Anterior maxillipeds only composed of 2 distinctly defined joints, the proximal one rather large and provided inside with a short lobe tipped with 2 small spines; distal joint produced at the end to a strong claw-like spine accompanied outside by another much narrower spine, its outer edge provided with 4 small bristles arranged in pairs. Posterior maxillipeds very small and closely approximate, each forming a narrow somewhat curved lamella, with 3 small setæ at the tip and 2 other similar setæ in about the middle of the outer edge. The 4 anterior pairs of legs of essentially same structure, with both rami biarticulate, the outer one somewhat incurved and without any setæ inside, but armed outside and at the tip with strong spines; inner ramus carrying on the extremity 3—4 exceedingly long and quite smooth spiniform setæ extending backwards along the median line of the belly. Last pair of legs transformed to 2 very large curved lamellæ¹⁾ encompassing the middle part of the body and completely arching over the ovisacs. The latter closely juxtaposed and of oblong oval form, reaching nearly to the end of the 1st caudal segment. Ovarial tubes very conspicuous in the living animal, and extending far into the tail.

Male of very small size, as compared with the female, and rather unlike it in its outward appearance, the body being somewhat depressed in its anterior

¹⁾ It is the merite of Canu to have given a right interpretation of these lamellæ, the significance of which was wholly miscomprehended by Thorell and most other authors.

part and gradually attenuated behind, with the head comparatively of larger size. Antennæ, oral parts, and caudal rami of exactly same structure as in the female. Legs however very different, the 4 anterior pairs exhibiting quite a normal structure, with both rami 3-articulate and armed in the usual manner, being all well adapted for swimming. Last pair of legs very small, knoblike.

Body of female, in the living state, of a light reddish hue, with the ovarian tubes and the ripe ova of a deep rosy colour.

Length of adult female attaining 4.10 mm., that of male only 1.20 mm.

Remarks.—The present form cannot be confounded with any of the other known Notodelphyoidæ, being at once recognised by its slender vermiform body. The specimen described by Thorell as the male of this species, is quite certainly not a male, but an immature female, in which the 5th pair of legs had not yet attained its full development. The form recorded by Hesse under the name of *Coeliacola setifera* is apparently identical with the present species.

Occurrence.—Several female specimens of this peculiar Copepod have been collected by me at different times and in different places on the Norwegian coast. They were found in the branchial cavity of several kinds of Ascidians. Of males I have only as yet come across a single specimen, and this was not found in Ascidians, but freely among some dredged material obtained at Drøbak, upper part of the Christiania Fjord.

Distribution.—Coast of Bohuslän (Thorell), British Isles (Brady), coast of France (Hesse, Canu).

Fam. 5. Botryllophilidæ.

General Characters.—Body more or less distinctly segmented, with the anterior division, as a rule, much broader than the posterior. Ripe ova not received in any incubatory cavity, but accumulated to form one or 2 free ovisacs appended to the dorsal face of the genital segment. Tail cylindric in form, and composed of a varying number of segments in the different genera. Caudal rami armed at the extremity with strong claw-like spines. Anterior antennæ short and compressed, narrowly exerted at the end. Posterior antennæ not prehensile. Oral parts well developed, but rather different in structure from those in the preceding families. Posterior maxillipeds

exceedingly powerful, representing the chief attaching organs of the animal. The 4 anterior pairs of legs more or less reduced and, as least in female, quite unsuitable for swimming. Last pair of legs in female transformed as supports for the ovisacs.

Remarks.—This family is established to include 3 nearly allied genera, to be treated of in the sequel, that of the earliest date being *Botryllophilus* Hesse. The family agrees with the *Ascidicolidae* in the presence of free orisacs in the female, but differs considerably in the structure of the several appendages, the most prominent difference being the transfer of the affixing faculty to the posterior maxillipeds.

Gen. 12. *Botryllophilus*, Hesse, 1864.

Generic Characters.—Anterior division of body in female very sharply marked off from the posterior and rather tumid, carrying at the end, on each side, the transformed 5th pair of legs. Tail narrow cylindric in form, and composed of 4 well defined segments. Anterior antennæ with the number of segments rather reduced. Posterior antennæ with the middle joint very short, terminal joint elongate and armed with strong spines. Mandibles with the masticatory part considerably expanded, palp biramous with the inner ramus largely developed, the outer very small. Maxillæ with the exopodal lobe obsolete. Anterior maxillipeds comparatively feeble in structure, and divided inside into a number of digitiform lobes, each tipped with a single curved spiniform seta. Posterior maxillipeds very powerfully developed, and pronouncedly prehensile, terminating in a claw-like biarticulate digit. The 4 anterior pairs of legs (in female) with the rami short, uni- or biarticulate, the outer one spiniferous, the inner setiferous. Last pair of legs in female forming 2 narrow setiferous lappets attached to the sides of the last trunkal segment and extending backwards, encompassing between them the single or double ovisac. The latter more or less globular in form.

Remarks.—The present genus was established as early as the year 1864 by Hesse, to include a peculiar Copepod (*B. ruber*) found by him within a compound Ascidian (*Botryllus*). Subsequently 2 forms evidently referable to the same genus were recorded, the one by Scott from the Scottish coast, the other by Canu from the French coast. Scott identified, though with some doubt, the form observed by him with Hesse's species, whereas Canu regarded his form as a new species and described it under the name of *B. macropus*. As

the original description and figures given by Hesse are very imperfect, it remains still questionable, whether the one or the other of these 2 forms should be regarded as identical with *B. ruber* Hesse. I should be inclined to believe that these 3 forms in reality represent as many distinct species. They all however agree in the peculiar shape of the transformed last pair of legs, and this is indeed one of the most conspicuous characters distinguishing the present genus from the other 2 genera treated of in the sequel. Scott has described the adult male of the species observed by him. It is about half the size of the female, and differs from it conspicuously, both as regards the general form of the body and the structure of some of the appendages. Thus the anterior antennæ are densely clothed, especially at the base, with delicate band-like setæ (æsthetascs?), and the legs are built on a quite different type, the 4 anterior pairs being apparently well adapted for swimming. A well defined new species referable to the present genus will be described below.

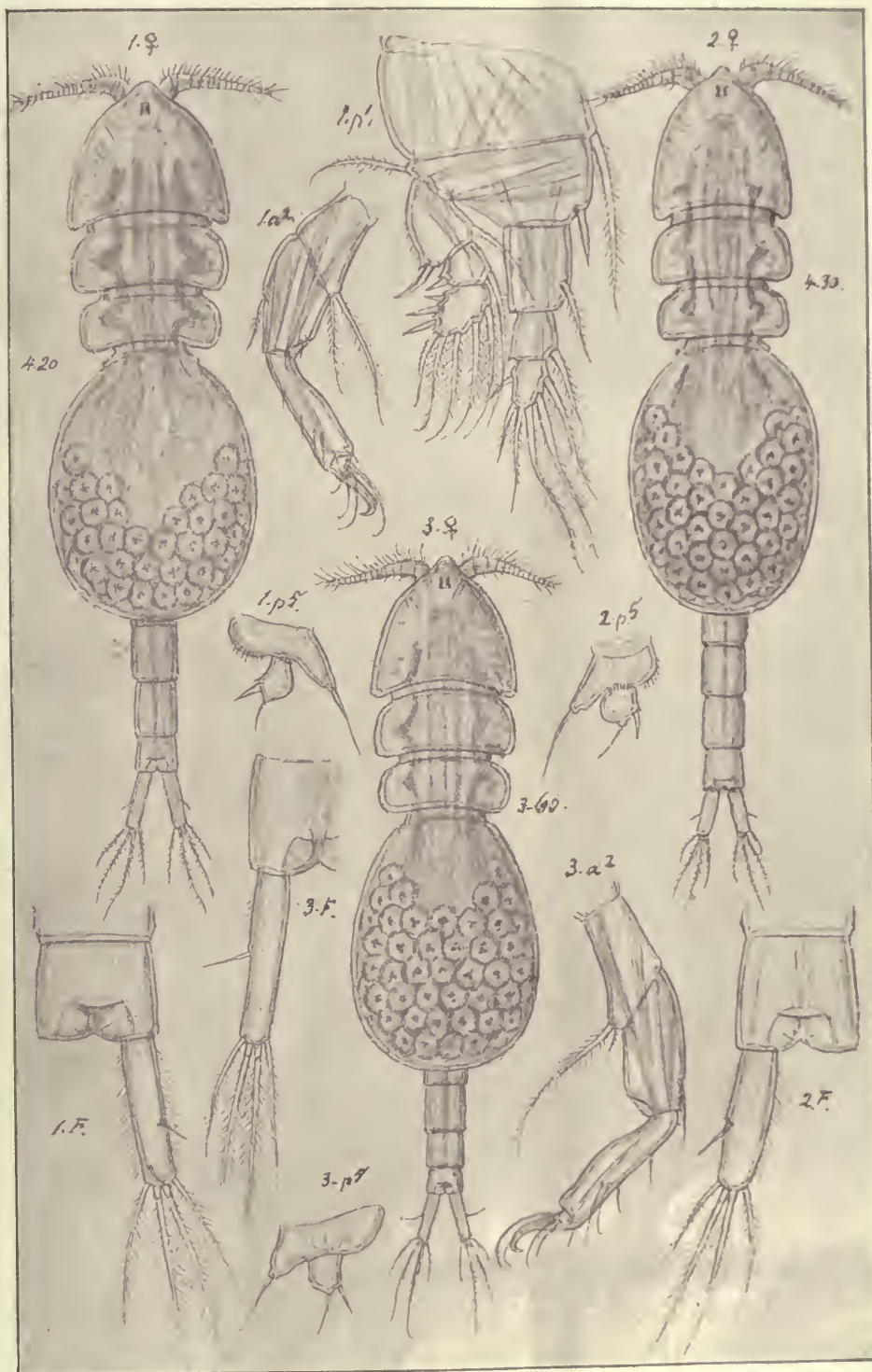
22. *Botryllophilus brevipes*, G. O. Sars, n. sp.

(Pl. XXXIII)

Specific Characters.—Female. Body comparatively short and stout, with the anterior division oblong oval in form, and having all the segments confluent, no traces of any dividing sutures being observable. Cephalic part defined from the trunk above by a very slight depression, and gradually contracted anteriorly, being produced in front to a very small, abruptly deflexed rostral prominence. Dorsal face of trunk gently vaulted and abruptly curved behind. Tail considerably exceeding half the length of the anterior division, and perfectly straight; 1st segment much the largest and rather tumid in its proximal part; anal segment somewhat longer than the preceding one. Caudal rami short and somewhat curved outwards, being armed at the extremity with 4 strong curved claws. Eye imperfectly developed, though easily observable in the living animal. Anterior antennæ short and compressed, very broad at the base, but rapidly tapered distally, being composed of only 4 joints sharply defined from each other, and clothed with a few rigid setæ issuing from knob-like prominences of the edge. Posterior antennæ a little longer than the anterior and abruptly bent in the middle, 1st joint fully as long as the other 2 combined and perfectly smooth; terminal joint linear in form and armed on the outer edge with 2 strong spines, the obtusely rounded extremity of the joint carrying 3 somewhat smaller spines followed by 2 slender setæ. Mandibles with the outermost tooth of the cutting edge distinctly bifurcate, palp rather

Notodelphyoida

Pl. XVII



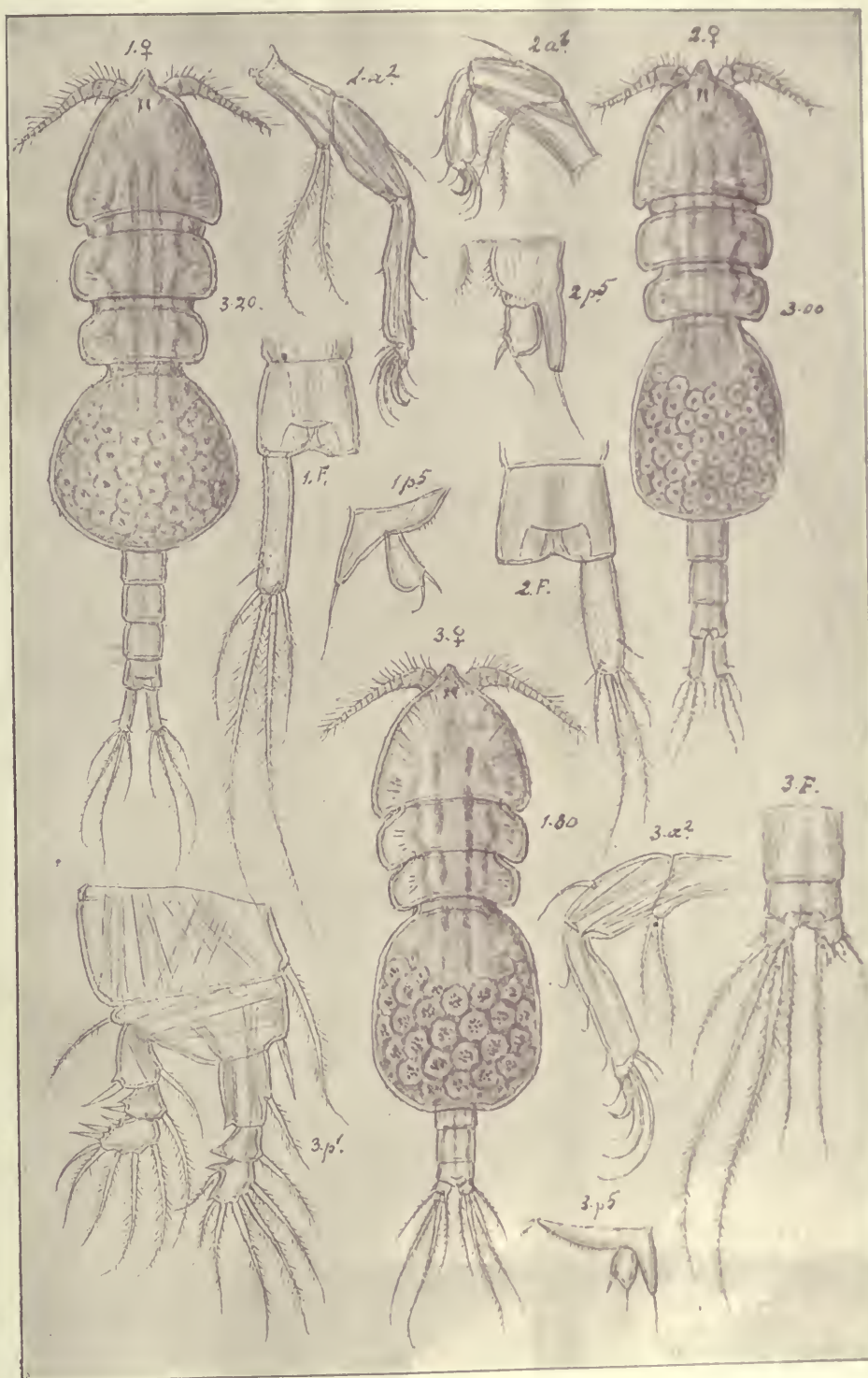
1. *Notodelphys rufescens*, Thorell
2. " *cærulæa*, Thorell
3. " *agilis*, Thorell

Copepoda

Notodelphyidae

Notodelphyoida

Pl. XVIII

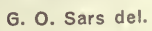


G. O. Sars del.

1. *Notodelphys tenera*, Thorell
2. " *elegans*, Thorell
3. " *prasina*, Thorell

Notodelphyoida

Pl. XIX



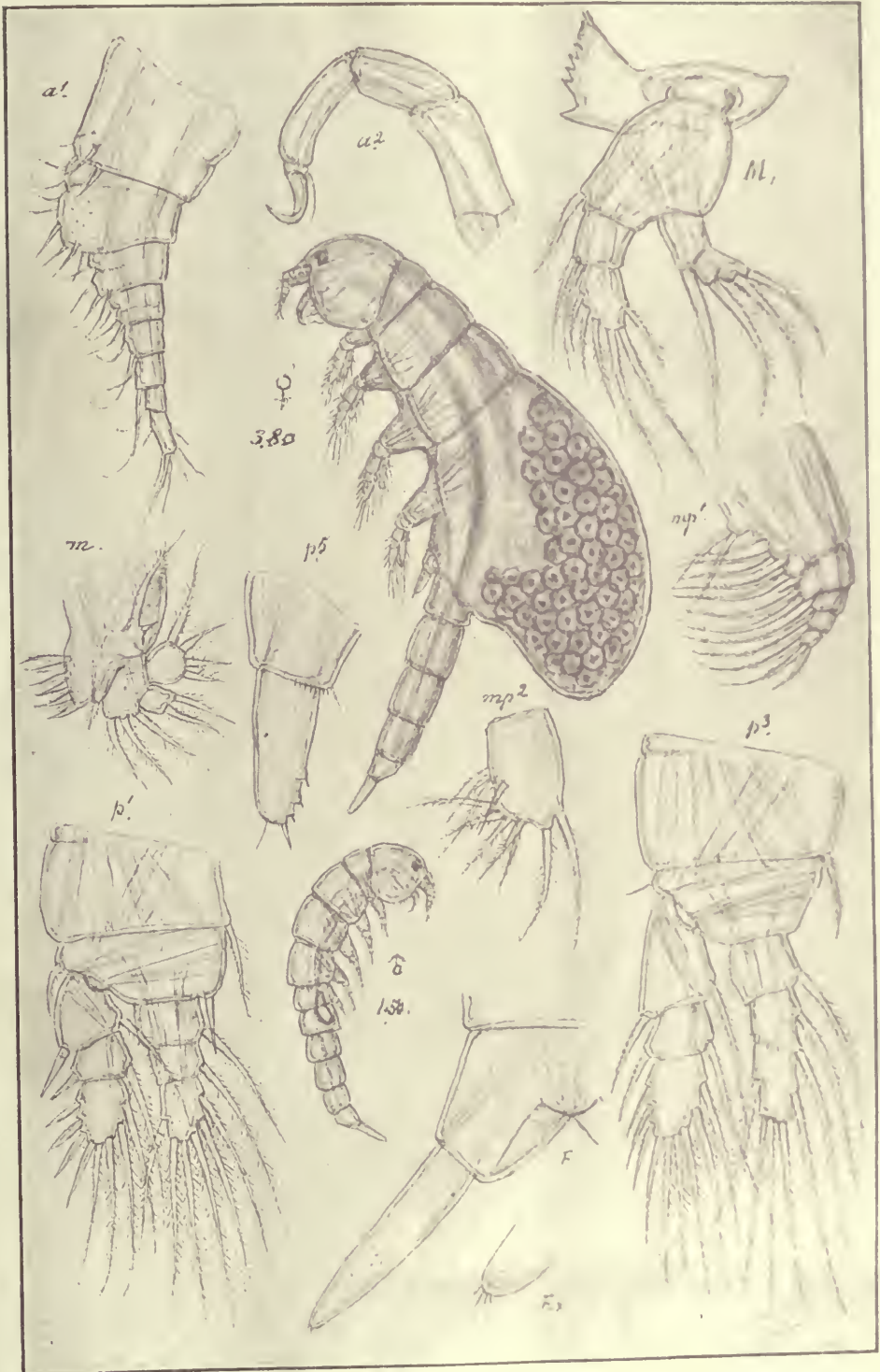
Agnathaner typicus, Canu

Copepoda

Doropygidæ

Notodelphyoida

Pl. XX



G. O. Sars del.

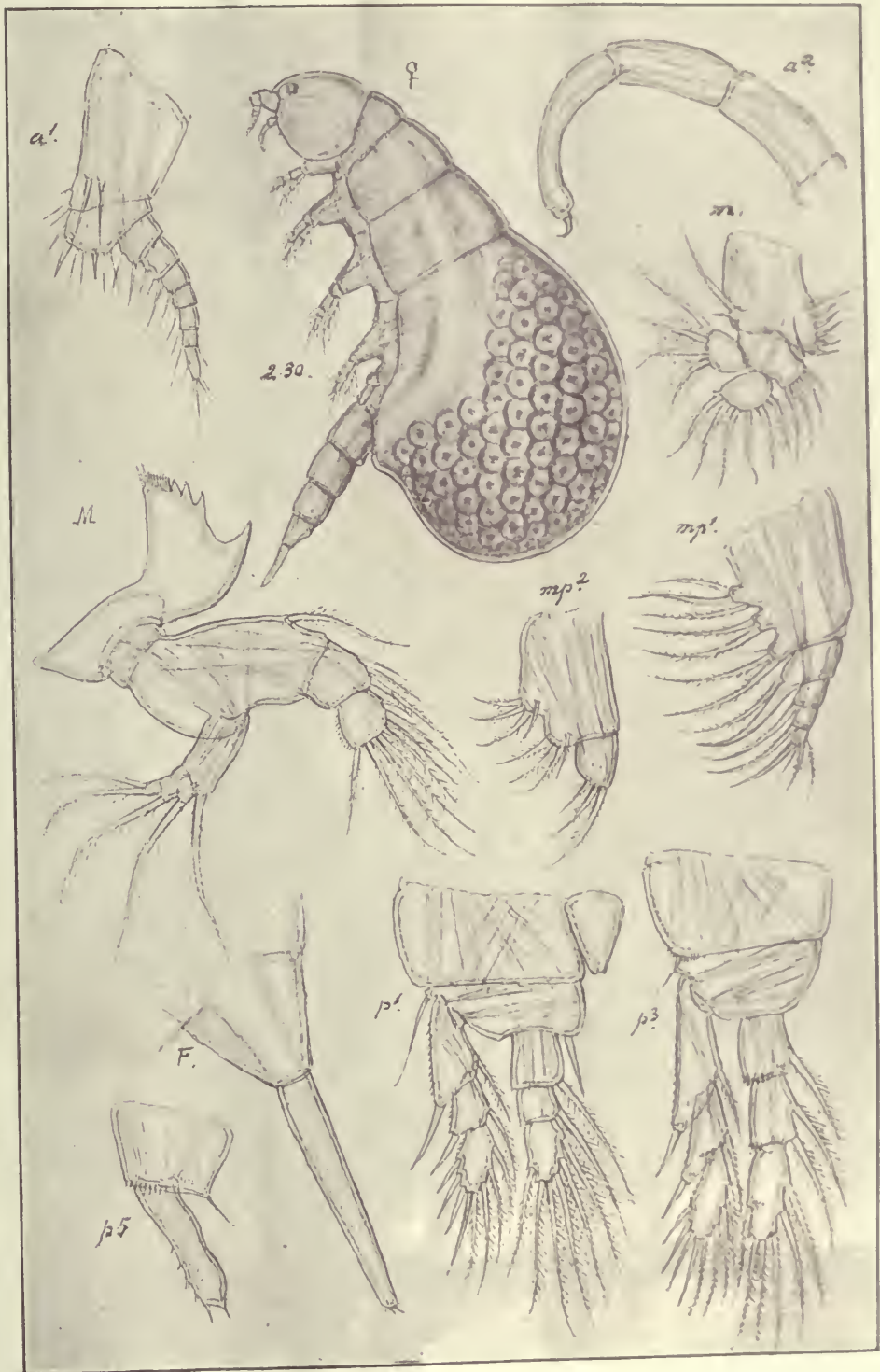
Doropygus pulex, Thorell

Copepoda

Doropygidæ

Notodelphyoida

Pl. XXI



G. O. Sars del.

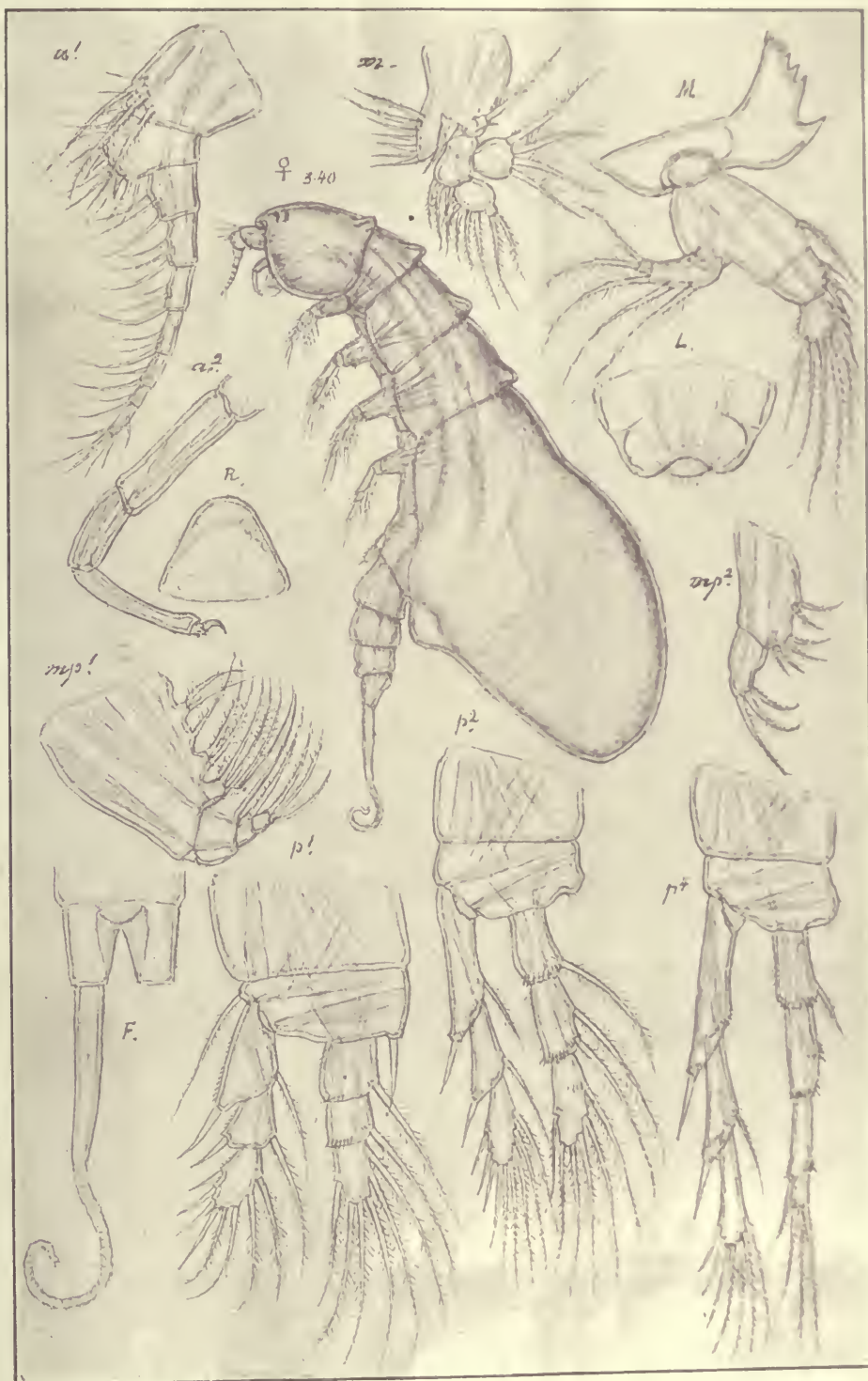
Doropygus psyllus, Thorell

Copepoda

Doropygidæ

Notodelphyoida

Pl. XXII



G. O. Sars del.

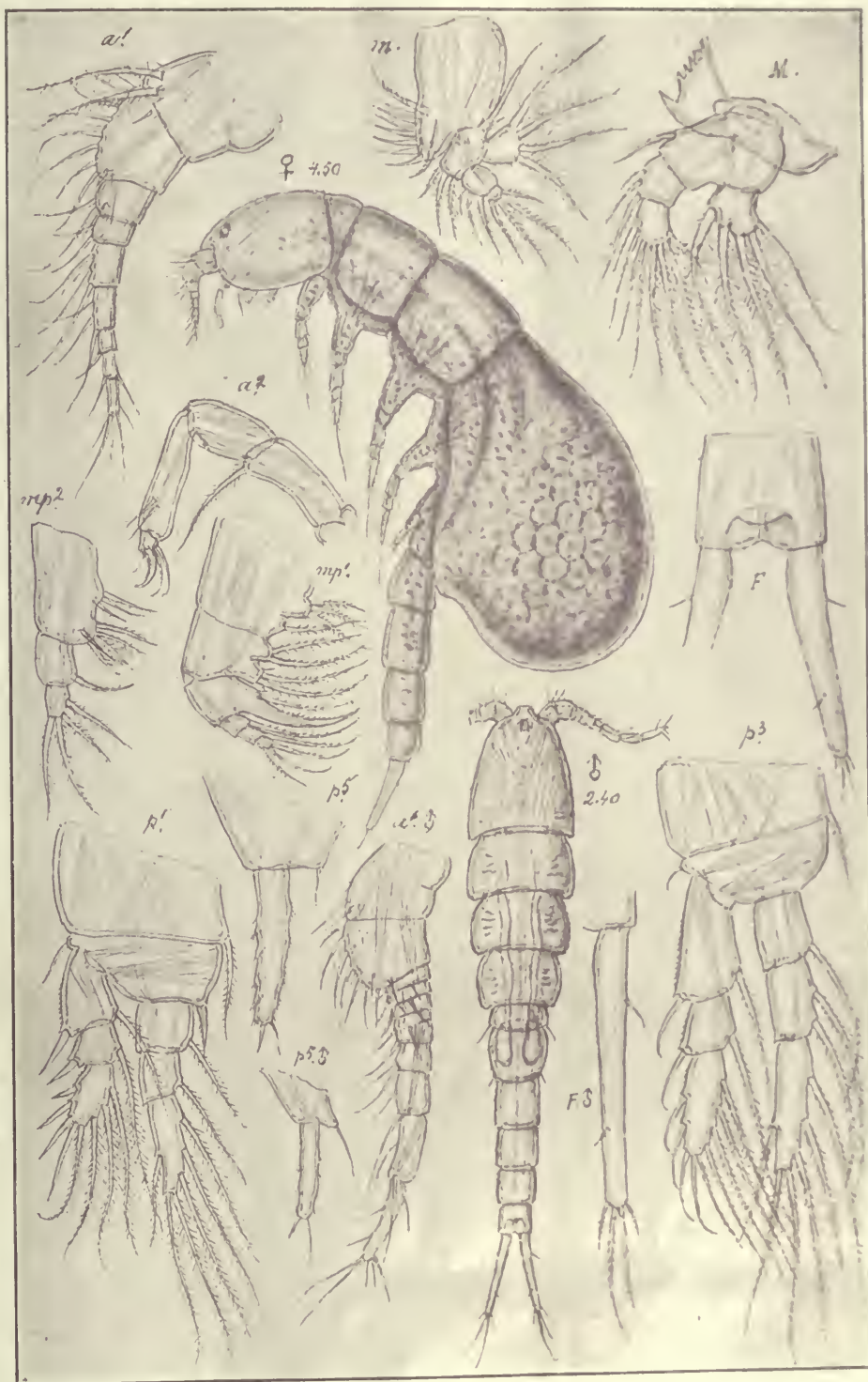
Doropygus porcicauda, Brady

Copepoda

Doropygidæ

Notodelphyoida

Pl. XXIII



G. O. Sars del.

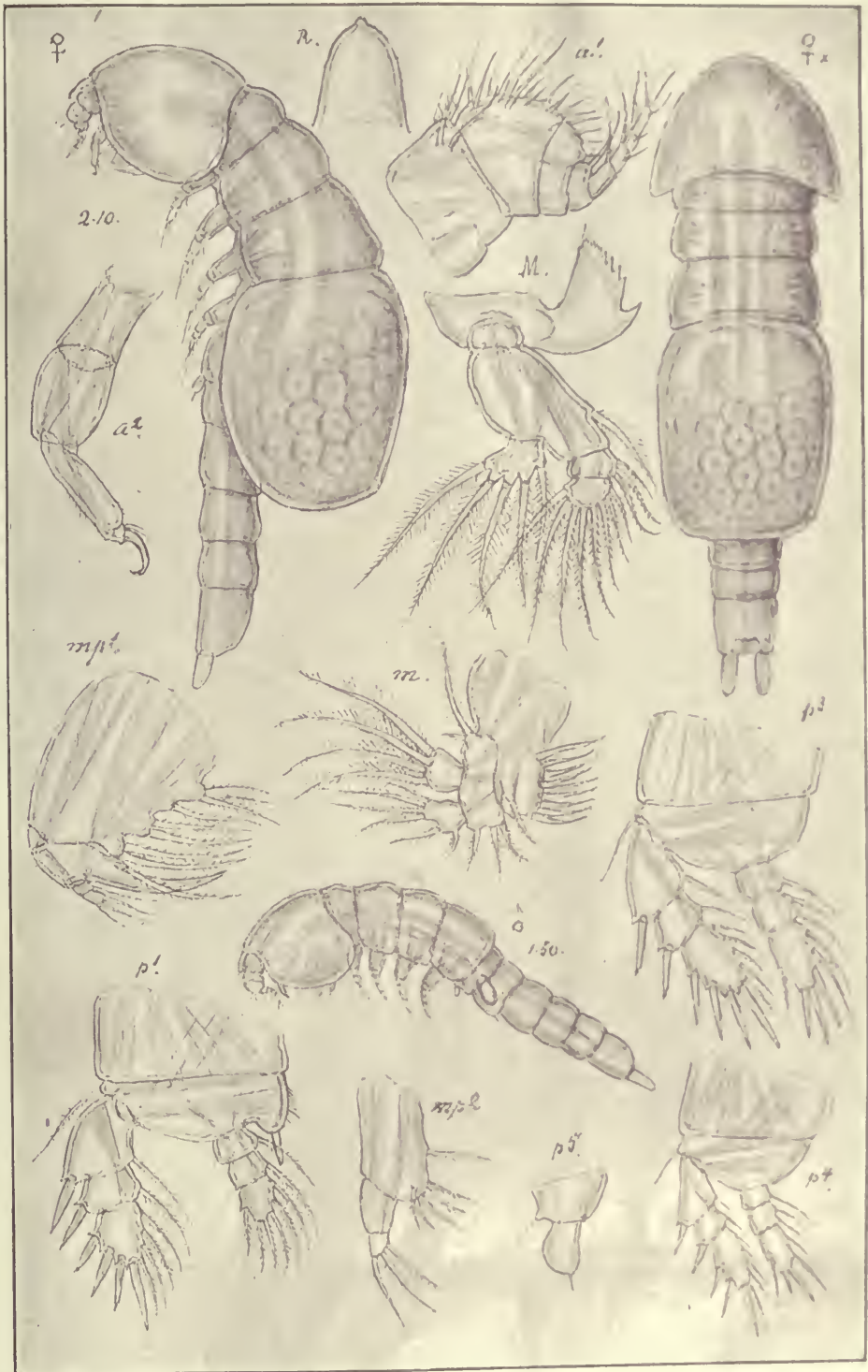
Doropygopsis longicauda, (Auriv.)

Copepoda

Doropygidæ

Notodelphyoida

Pl. XXIV



G. O. Sars del.

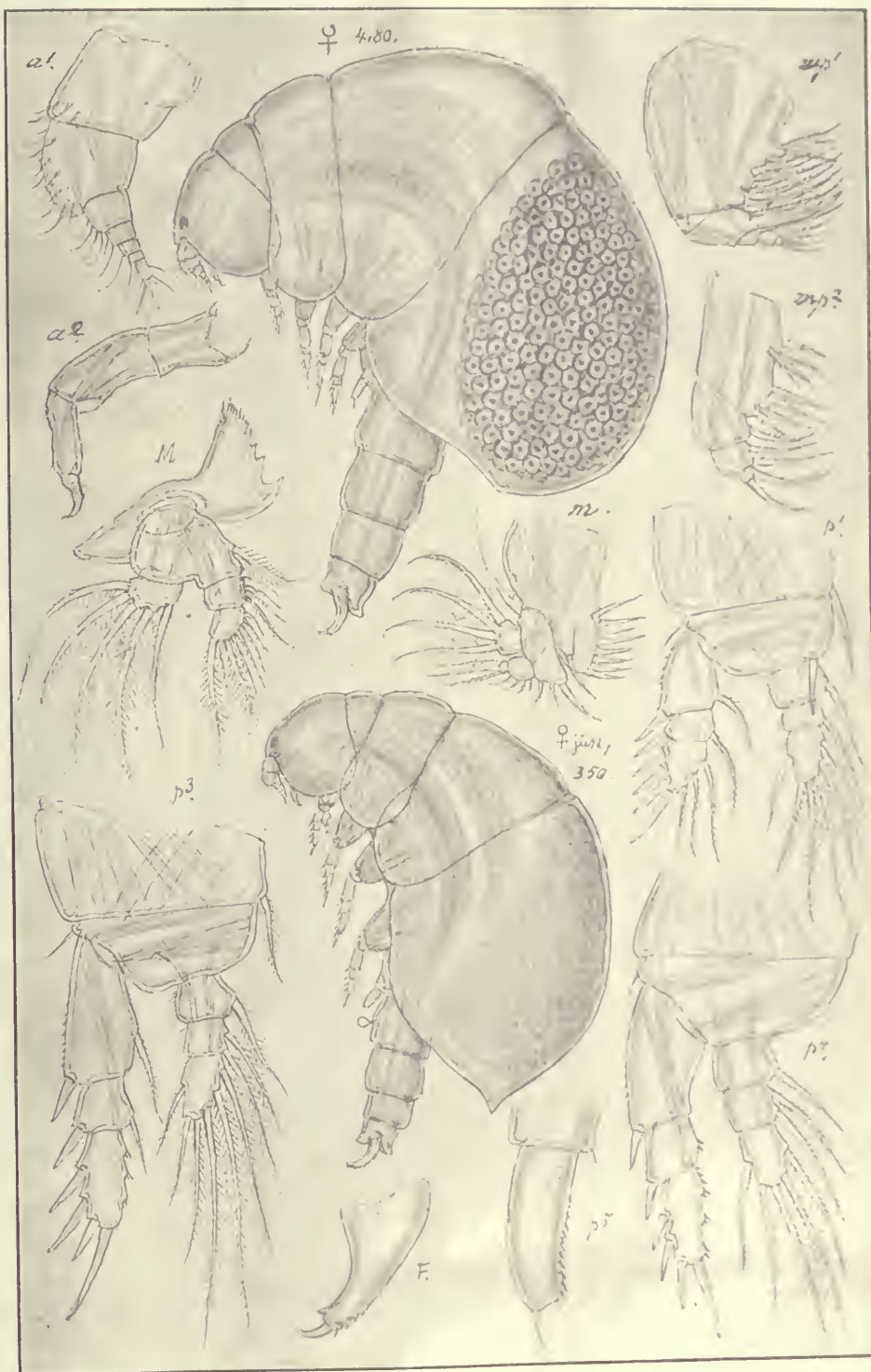
Doropygella Thorelli, (Auriv.)

Copepoda

Doropygidae

Notodelphyoida

Pl. XXV



G. O. Sars del.

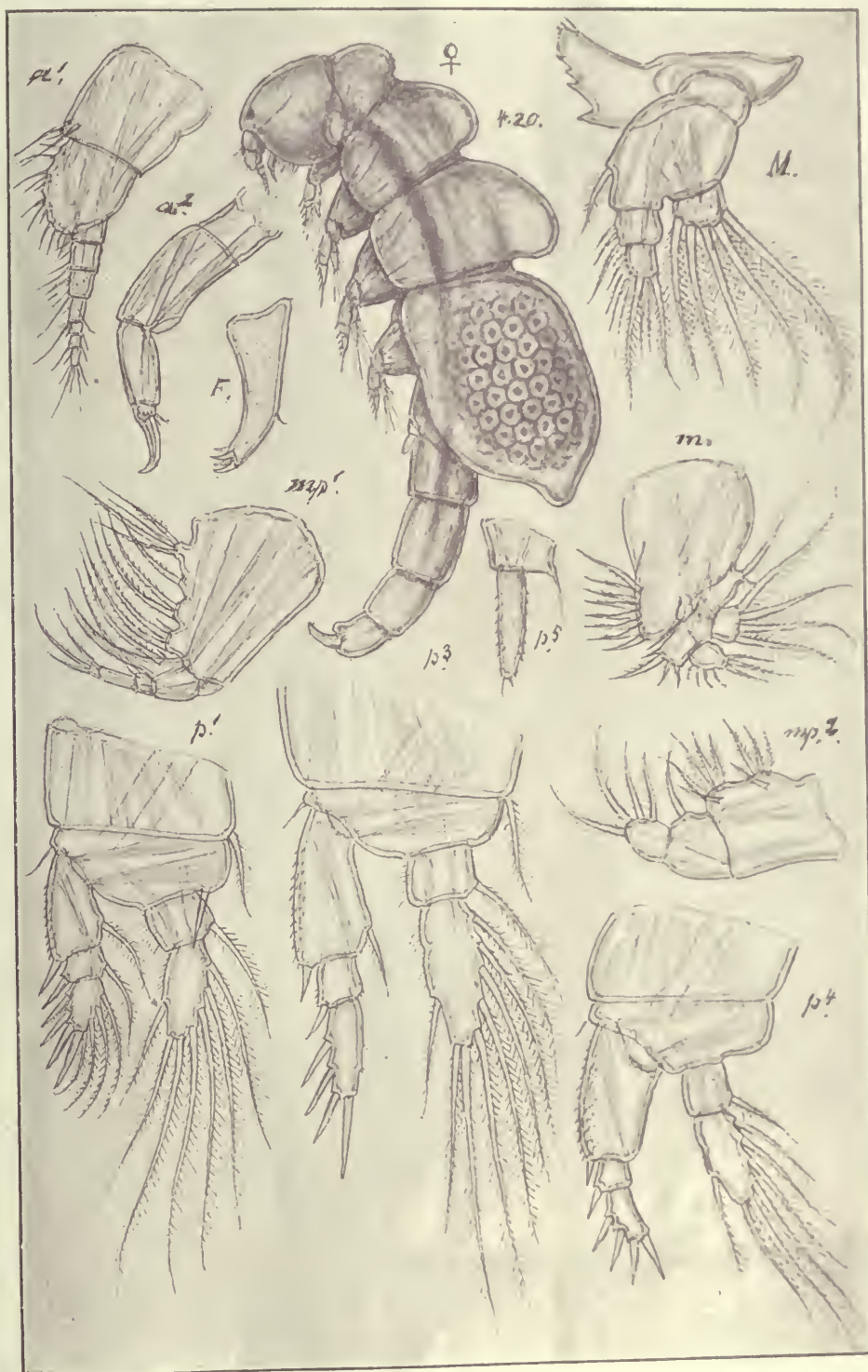
Pachypygus gibber, (Thorell)

Copepoda

Doropygidæ

Notodelphyoida

Pl. XXVI



G. O. Sars del.

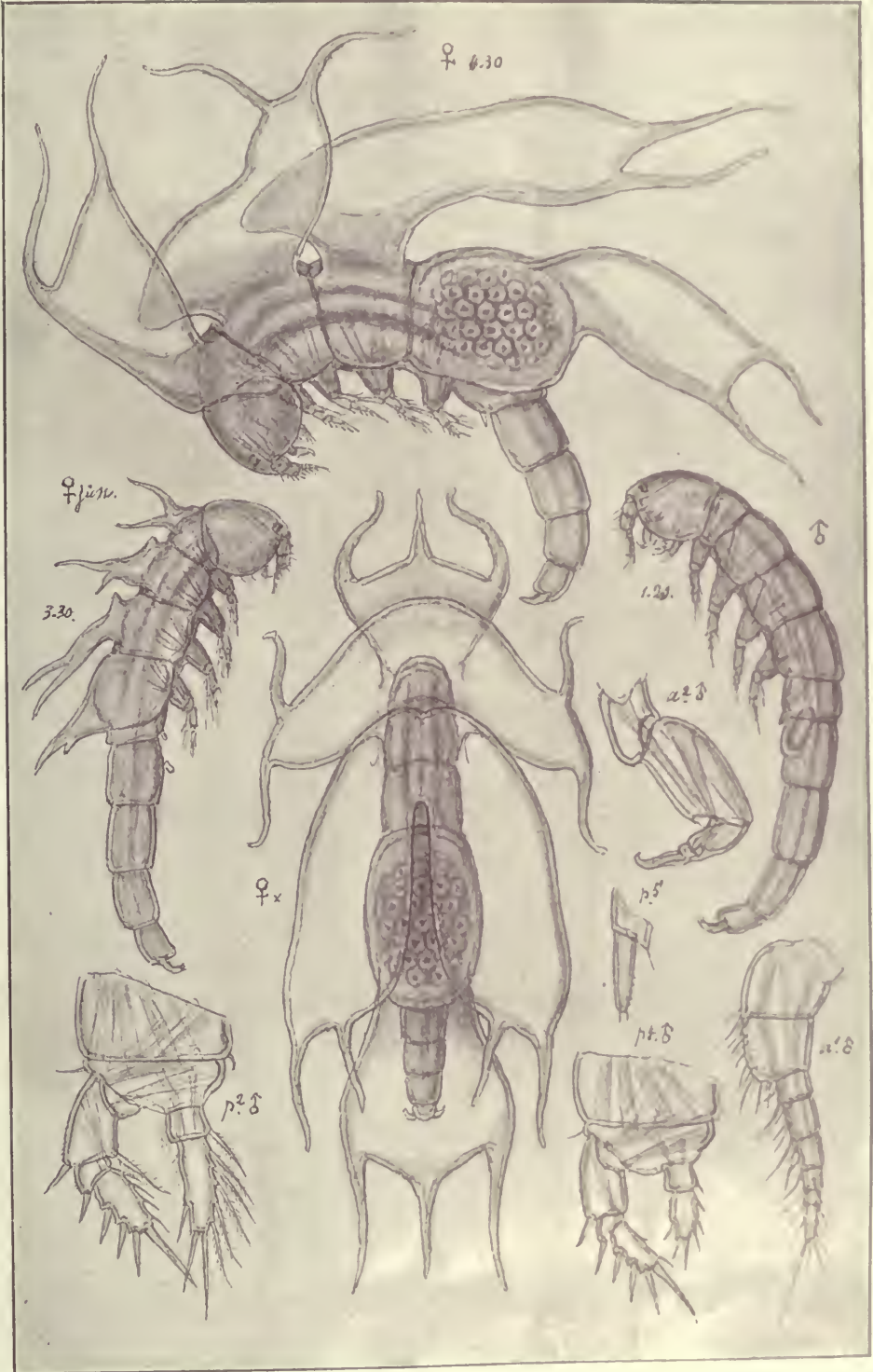
Notopterophorus auritus, (Thorell)

Copepoda

Dorpygidæ

Notodelphyoida

Pl. XXVII

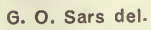


G. O. Sars del.

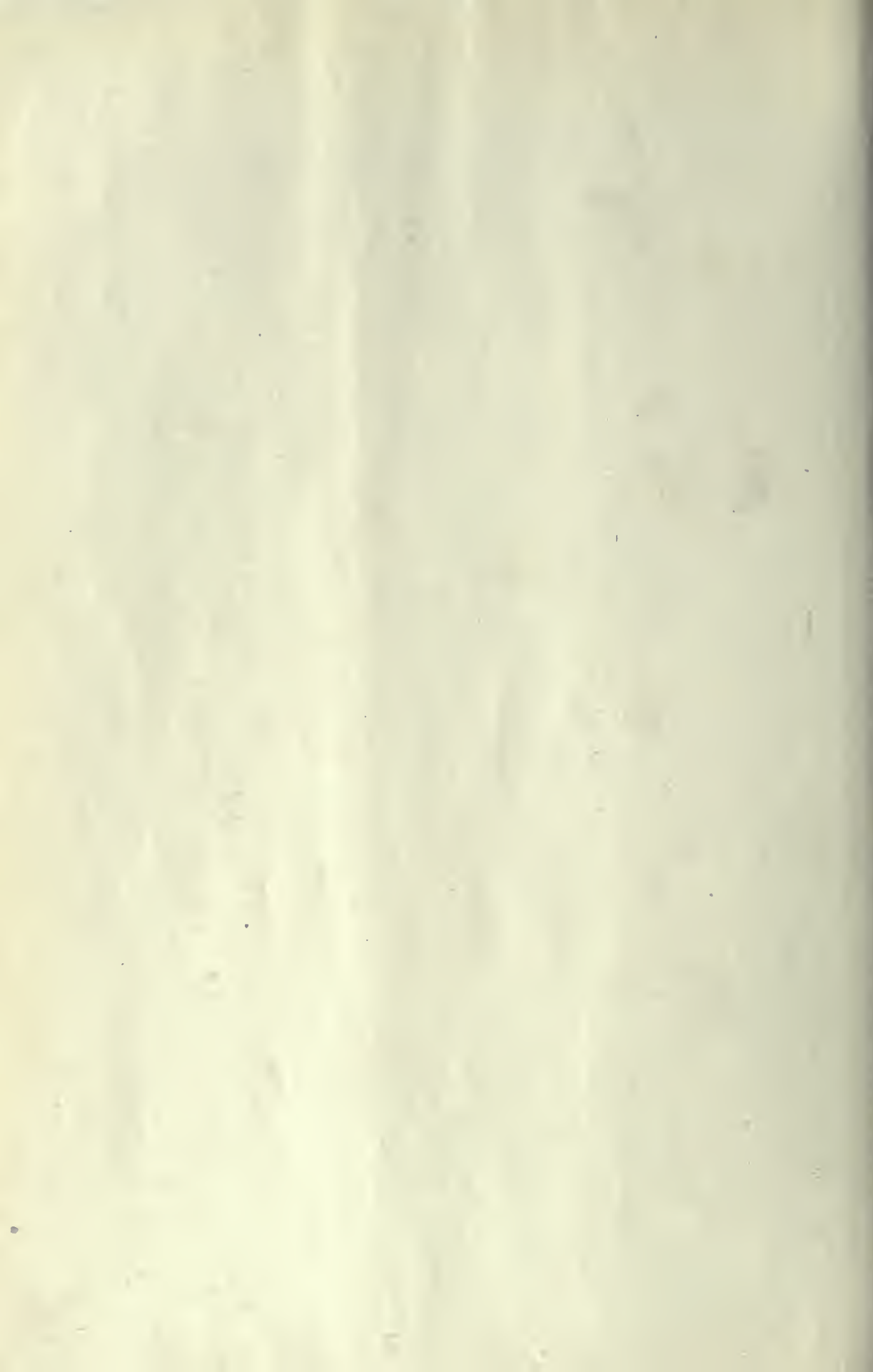
Notopterochorus papilio, Hesse

Notodelphyoida

Pl. XXVIII



1. *Notopterophorus micropterus*, G. O. Sars
2. *Gunentophorus globularis*, Costa

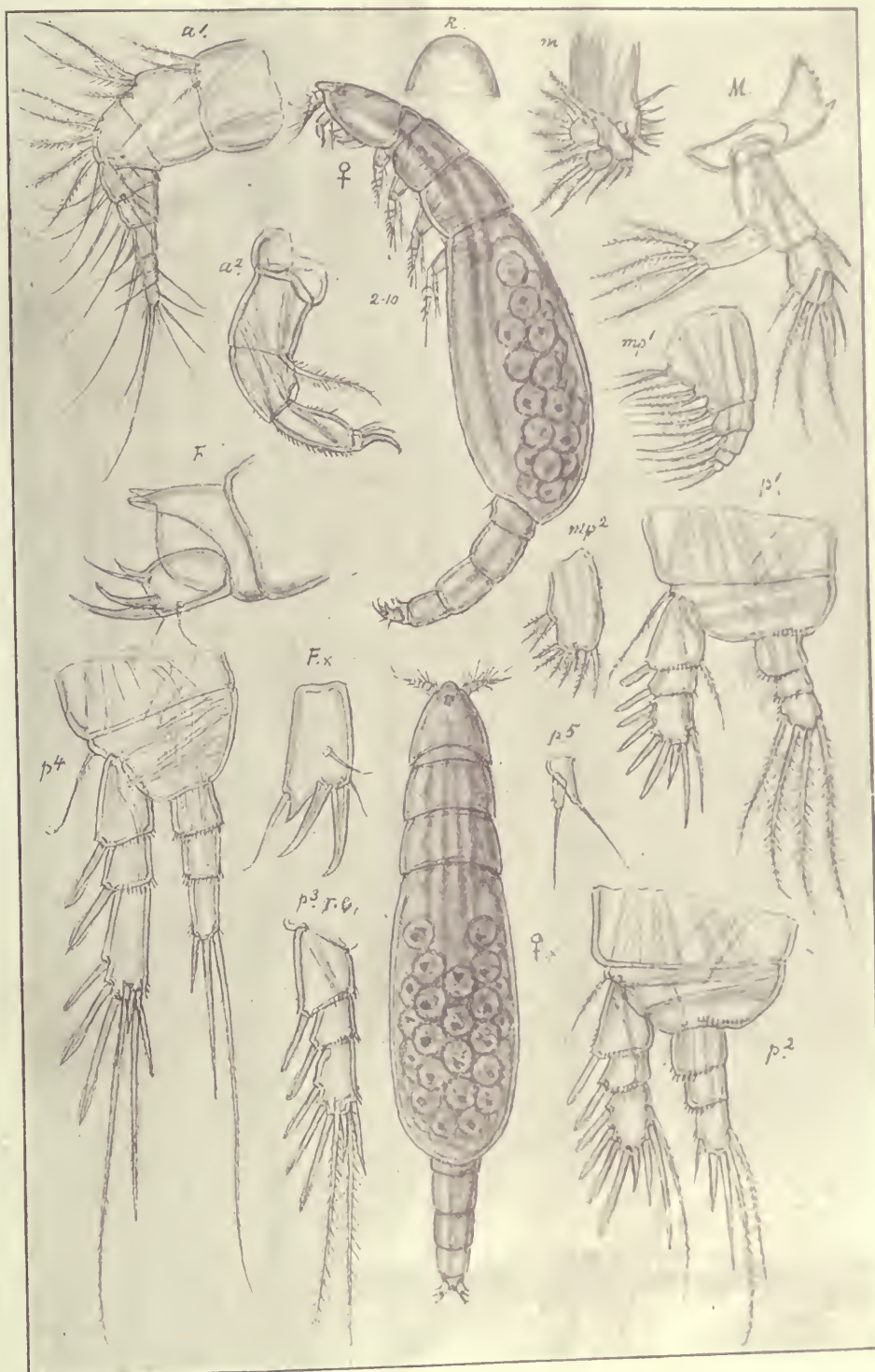


Copepoda

Notodelphyoida

Doropygidæ

Pl. XXIX



G. O. Sars del.

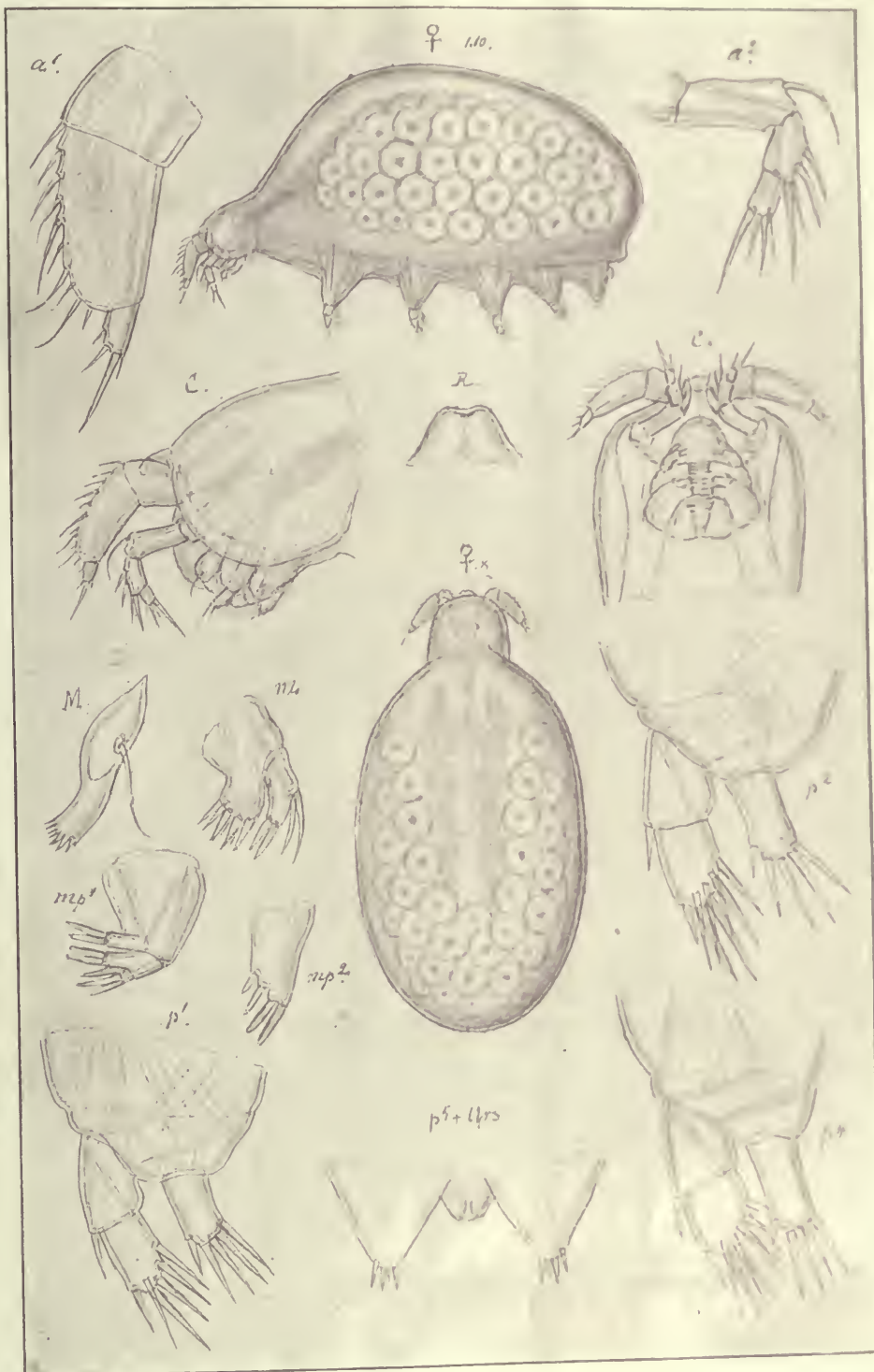
Botachus cylindratus, Thorell

Copepoda

Notodelphyoida

Buproridæ

Pl. XXX



G. O. Sars del.

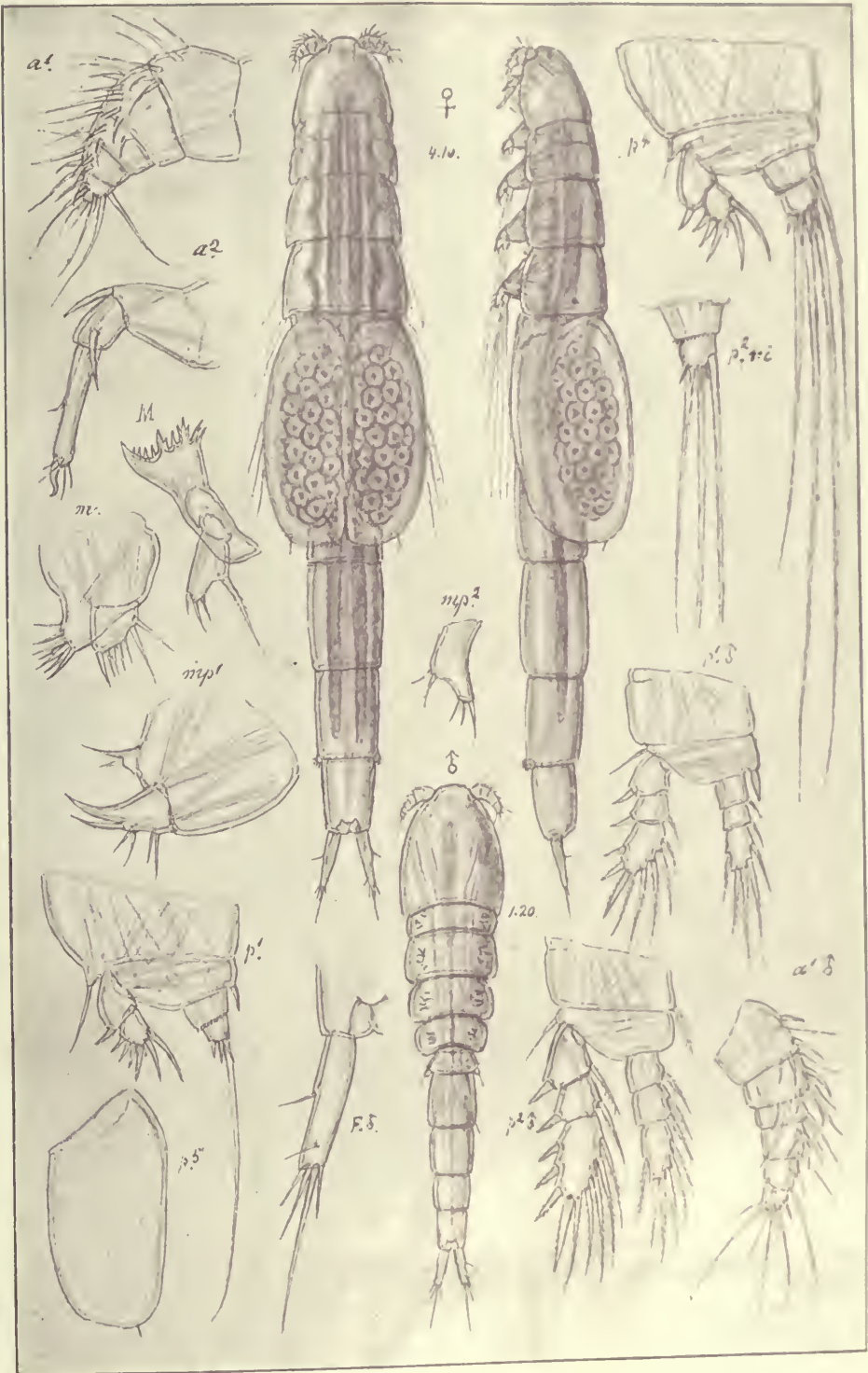
Buprorus Lovéni, Thorell

Copepoda

Notodelphyoida

Ascidicolidæ

Pl. XXXI



G. O. Sars del.

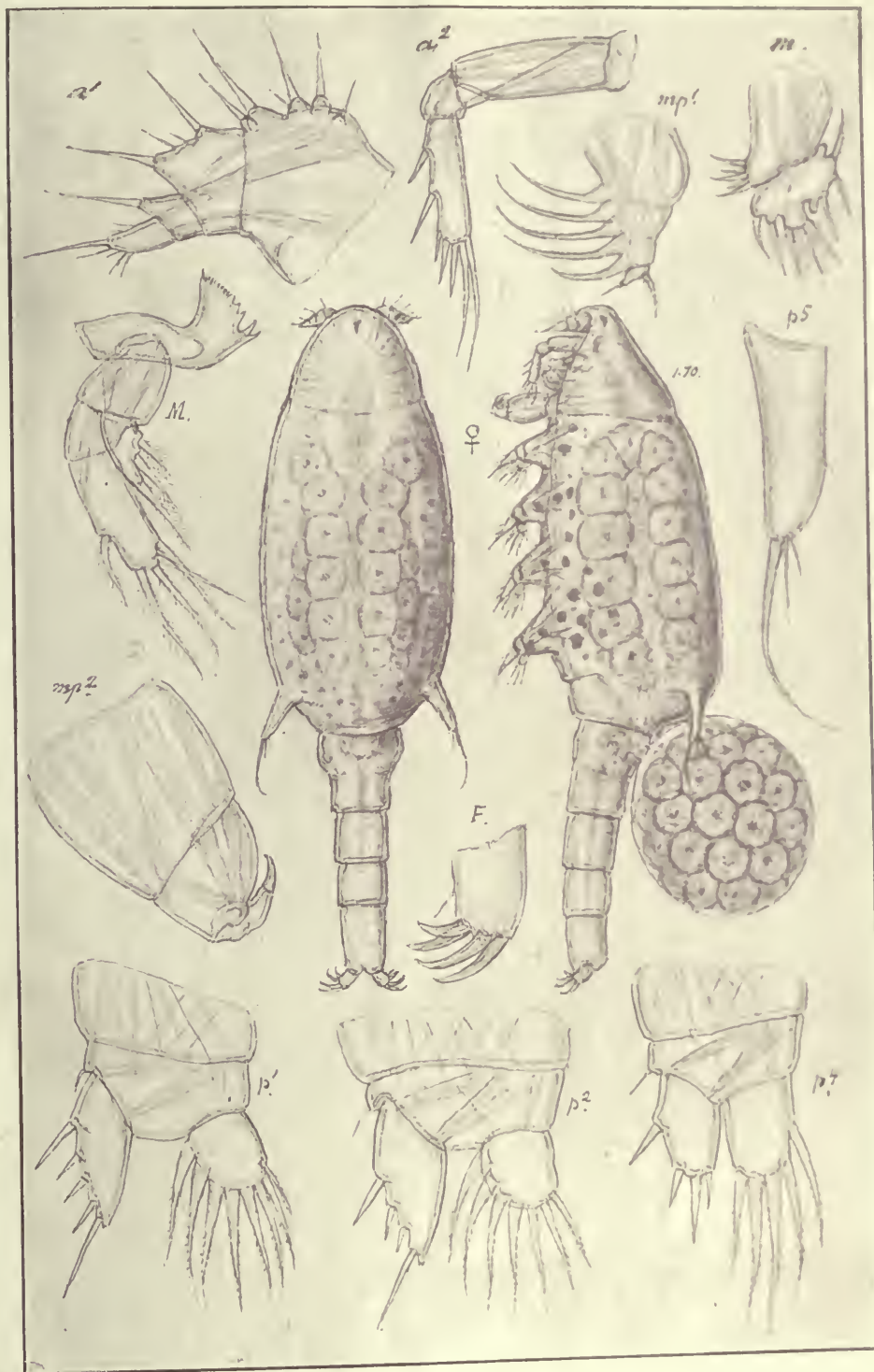
Ascidicola rosea, Thorell

Copepoda

Botryllophilidæ

Notodelphyoida

Pl. XXXII



G. O. Sars del.

Botryllophilus brevipes, G. O. Sars

large, far exceeding in length the body of the mandible, rami however of very unequal size, the inner one being much the larger and fully twice as long as the basal part, proximal joint of this ramus imperfectly defined and without any setæ, distal joint oblong oval in form, and provided with 5 coarse setæ, one of which is attached to the outer edge, the other 4 to the obtusely rounded extremity; outer ramus attached close to the base of the inner, and forming a small triangular lamella, edged with 3 plumose setæ. Maxillæ with the masticatory lobe comparatively small, with a restricted number of spines; endopodal part with 2 comparatively short setæ inside the base, terminal joint imperfectly defined and edged with 3 similar setæ; exopodal lobe obsolete and replaced by 3 short setæ attached to the outer nearly straight edge of the palp, which is produced both proximally and distally to a small knob-like prominence. Anterior maxillipeds with the basal part imperfectly subdivided, and exhibiting inside 5 digitiform lobes and as many curved setæ; terminal part small, uniarticulate, with a minute apical spine and a densely ciliated seta outside the base. Posterior maxillipeds composed each of a very large and massive basal part divided into 2 segments, and of a comparatively short, but very mobile biarticulate dactylus curved inwards. The 4 anterior pairs of legs much reduced, with both rami quite short and uniarticulate, the outer one narrow triangular in form, with the inner edge perfectly smooth, the outer armed with 5 somewhat unequal spines; inner ramus rounded oval in form and fringed with thickish, sparingly ciliated setæ, the number of which is somewhat varying in the different pairs. Last pair of legs far less produced than in the other species, and attached to the sides of the posterior part of the trunk, somewhat nearer the dorsal face; each having the form of a narrow lanceolate lappet carrying on the tip a rather strong curved seta accompanied by 2 much smaller bristles, another still smaller bristle occurring on the upper edge somewhat beyond the middle. Only a single comparatively large globular ovisac present, attached to the dorsal face of the genital segment.

Body in the living animal of a pale reddish orange hue, with the ovarial tubes and the ripe ova bright green in colour. Length of adult female 1.70 mm.

Male unknown.

Remarks.—The above-described species may be easily distinguished from any of the other forms recorded by the quite unsegmented anterior division of the body, as also by the poor development of the legs.

Occurrence.—Some few female specimens of this form were found, many years ago, within the body cavity of a species of *Botryllus*, taken at Espevær, west coast of Norway.

Gen. 13. *Pteropygus*, G. O. Sars, n.

Generic Characters.—Body (of female) perfectly segmented, with the anterior division well marked off from the posterior, but less tumid than in *Botryllophilus*. Tail much narrower than the anterior division, and only composed of 3 segments; caudal rami short, clawed at the end. Antennæ and oral parts of a structure similar to that in *Botryllophilus*. The 4 anterior pairs of legs with both rami short, uniarticulate, the outer one spiniferous, the inner setiferous. Last pair of legs transformed to 2 large wing-like lamellæ encompassing the last trunkal segment and meeting each other at the base dorsally, partly obtecting the single cake-like ovisac.

Remarks.—The present new genus is nearly allied to *Botryllophilus*, but differs conspicuously in the perfect segmentation of the anterior division of the body, the 3-articulate tail, and more particularly in the very unlike appearance of the last pair of legs, which are developed in a somewhat similar manner to that in the genus *Ascidicola*. The genus comprises as yet only a single species, to be described below.

23. *Pteropygus vestitus*, G. O. Sars, n. sp.

(Pl. XXXIII).

Specific Characters.—*Female*. Body comparatively short and stout, with the anterior division of nearly equal width throughout, and only very slightly vaulted dorsally. Cephalic segment scarcely narrower than the succeeding segment and evenly rounded in front, rostral prominence very slight. Last trunkal segment well defined and abruptly narrowed behind. Tail about equalling in length the trunk, and narrow cylindrical in form, with its 3 segments of nearly equal size. Caudal rami turned straight outwards, and armed at the end with 4 strong curved claws arranged in pairs. Eye very small. Anterior antennæ short and compressed, broad at the base, but rapidly tapered distally, being composed of 6 well defined joints clothed in front with numerous unequal rigid setæ. Posterior antennæ very like those in *Botryllophilus*, last joint armed with 8 spines, 4 on the outer edge and 4 on the tip. Mandibles with the 2 outermost teeth of the cutting edge much larger than the others; palp very large, nearly twice the length of the body of the mandible, and of a structure very similar to that in *Botryllophilus*. Maxillæ likewise rather similar, though having the terminal joint of the palp distinctly defined at the base. Anterior maxillipeds comparatively more fully developed than in that

genus, but built on the very same type. Posterior maxillipeds large and massive, forming, as in *Botryllophilus*, the chief attaching organs. The 4 anterior pairs of legs very imperfectly developed, outer ramus cultriform, with 6 strong spines outside, inner ramus rather smaller and scarcely lamelliform, being narrowed distally, and only provided with a restricted number of setæ at the tip. Last pair of legs forming 2 broadly oval lamellæ encompassing the body like a mantle, and extending nearly to the middle of the tail, each lamella provided at the end below with a small bristle. Ovisac oval, flattened, and extending almost to the end of the tail.

Colour whitish gray.

Length of adult female 1.80 mm.

Male unknown.

Remarks.—The above-described form cannot be confounded with any of the other members of the present family. From the species of the genus *Botryllophilus* it is at once distinguished by the very different appearance of the transformed last pair of legs, in which respect it more resembles the form next to be described.

Occurrence.—A few female specimens only of this peculiar form have as yet come under my notice. They were taken at Risør, south coast of Norway, and, as far as I remember it, from the branchial cavity of *Phallusia obliqua*.

Gen. 14. *Schizoproctus*, Aurivillius, 1885.

Generic Characters.—Body of female fusiform in shape, with thin and soft integuments and the segments only indicated by slight constrictions; that of male more distinctly segmented and of extremely small size, as compared with the female, to the ventral face of which it is found attached. Tail apparently composed of 5 segments, and not very sharply marked off from the trunk. Caudal rami small, curving outside, and minutely clawed at the end. Antennæ and oral parts built on the same type as in the 2 preceding genera, but on the whole less fully developed. The 4 anterior pairs of legs very small, with the rami uniarticulate and nearly of equal structure, both forming small triangular pieces armed outside with short spines. Last pair of legs (in female), as in *Pteropygus*, transformed to broad lamellæ extending on each side along the base of the tail and separated dorsally by a deep and narrow cleft. Ovisac not yet observed.

Remarks.—This genus, established by Aurivillius, is evidently referable to the same family as the 2 preceding genera, though the outward appearance

of the body looks rather different, and more resembles that in some forms belonging to the next family. In the structure of the several appendages it seems to come nearest to the genus *Pteropygus*, but differs conspicuously in the general form of the body and its less distinctly marked segmentation, as also very essentially in the structure of the tail. The genus comprises as yet only a single species, to be described below.

24. *Schizoproctus inflatus*, Aurivillius.

(Pl. XXXIV)

Schizoproctus inflatus, Aurivillius; Krustaceer hos arktiske Tunicater, Vega Expeditionens vetenskaplige Arbeten, p. 248, Pl. 9, figs. 21—32.

Specific Characters.—Female. Body oblong fusiform in shape and rather tumid in the middle, but gradually narrowed both in front and behind; dorsal face evenly vaulted. Tail about equalling in length $\frac{2}{3}$ of the anterior division and somewhat tapered distally, last segment nearly twice the length of the preceding one and narrowly rounded at the extremity. Caudal rami comparatively small, each armed with 4 short, somewhat unequal claws. Anterior antennæ very short and stout, composed of only 4 joints clothed in front with comparatively short spiniform setæ of unequal length. Posterior antennæ shorter and stouter than in the 2 preceding species, terminal joint armed outside with 3 short spines and at the broadly truncated extremity with 3 similar spines followed by 2 thickish setæ. Mandibles and maxillæ of essentially same structure as in *Pteropygus*. Anterior maxillipeds however considerably shorter and stouter, with an additional small seta inside the base; seta of 3rd joint replaced by a claw-like spine. Posterior maxillipeds very thick at the base, with the posterior edge of 1st joint coarsely serrate. The 4 anterior pairs of legs with both rami short, triangular in form, the outer one armed outside with 5 stout spines. Last pair of legs, as in *Pteropygus*, broad, mantle-like and approximate dorsally.

Male of dwarfy size, scarcely exceeding in length $\frac{1}{5}$ of the female, and found attached to the ventral face of her genital segment. Body somewhat depressed and gradually attenuated behind, with all the segments sharply defined, the genital one rather swollen and containing on each side a pear-shaped spermatophore.

Colour not yet ascertained.

Length of adult female 6.10 mm, of male 1.30 mm.

Remarks.—The present remarkable form was described by Aurivillius in

the above-quoted paper from a solitary female specimen found in the branchial cavity of a *Phallusia* obtained off the coast of Spitsbergen. It was regarded by that author as the type of a particular family, for which he proposed the name *Shizoproctidæ*, not being aware of the close relationship of this form to the genus *Botryllophilus* of Hesse.

Occurrence.—Some few specimens of this form were obtained, many years ago, from the branchial cavity of *Phallusia obliqua* taken at Vadsø, eastern Finmark, from a depth of about 60 fathoms. Aurivillius also records a single female specimen from the Finmark coast.

Distribution.—Spitsbergen (Aurivillius).

Fam. 6. Enterocolidæ.

General Characters.—Body of female more or less vermiform in shape and nearly motionless, with thin and soft integuments and the segments only faintly indicated; that of male (according to Canu) cyclopoid in shape and provided with well developed locomotory appendages. Tail, as a rule, poorly developed, terminating in 2 small and simple blad-like caudal rami. Anterior antennæ very small. Posterior antennæ biarticulate and not prehensile (in female). Only 2 pairs of oral appendages present, the mandibles and the anterior maxillipeds being wholly absent¹⁾. The 4 anterior pairs of legs (in female) very imperfectly developed, with the rami more or less rudimentary. 5th pair of legs, when present, forming 2 short lateral lappets issuing from the end of the anterior division of the body. Two free ov sacs present in female appended to the base of the tail and generally very long, cylindrical in form.

Remarks.—The type of this family is the genus *Enterocola* of v. Beneden which in many respects differs considerably from the other Notodelphyoida, and in the general appearance of the body (in female) bears a strong resemblance to some of the Lernæoida (Condracanthidæ). This is perhaps still more the case with some of the other forms belonging to the present family. Yet, some well marked points of agreement with the family *Botryllophilidæ* are

¹⁾ True, in some of the forms (*Enteropsis*, *Aplostoma*) mandibles have been described; but in my opinion the appendages so named are in reality not mandibles but more properly the maxillæ.

found to exist, and it therefore may be allowed to include the present family in the same great division. Moreover in habits these forms agree with the other Notodelphyoida in so far that they are parasites of the same group of animals, viz., the Tunicata. The want of any true masticatory appendages would seem to prove, that these Copepoda do not feed on any firm particles, but only on some nourishing fluids licked up from their hosts. In so far they present an evident agreement with the *poecilostomous Cyclopoida*, from which they indeed may be assumed to have been originally derived by a close adaption to changed conditions of life, just as the other Notodelphyoida in all probability by a similar adaption have taken their origin from *gnathostomous Cyclopoida*. 3 genera referable to the present family will be treated of below. Another genus, *Enteropsis*, has been established by Aurivillius, and moreover several of the peculiar forms recorded by Hesse, as found in compound Ascidians, may in all probability be included in the same family.

Gen. 15. **Cryptopodus**, Hesse, 1865.

Syn. *Aplostoma*, Canu.

Generic Characters.—Body of female oblong, more or less curved ventrally, with the anterior division well marked off from the posterior and terminating behind on each side in a short rounded lobe (the transformed 5th pair of legs), the last 2 trunkal segments coalesced. Tail very small and imperfectly segmented. Posterior antennæ smaller than the anterior ones, distal joint sublinear and minutely denticulate outside. Oral aperture forming a transverse fissure limited in front by a slightly prominent bell-shaped anterior lip. Maxillæ only present as a very trifling rudiment on each side of the oral aperture. Maxillipeds comparatively small, biarticulate, and terminating in a minute hook. The 4 anterior pairs of legs very imperfectly developed, basal part not distinctly defined, rami confluent at the base, the outer one forming a simple rounded lobe, the inner knife-shaped, with a few short denticles inside. Last pair of legs having the appearance of 2 simple conical lobes projecting on each side somewhat dorsally from the last trunkal segment. Ovisacs large, cylindrical in form.

Remarks.—This genus was established in the year 1865 by Hesse, but very imperfectly characterised, and on that account it was not recognised by subsequent authors. I think however I am right in identifying the genus *Aplostoma* of Canu with Hesse's genus. In any case the generic name proposed by Canu cannot be supported, as it has been long ago preoccupied.

The genus is prominently characterised by the small size of the posterior antennæ and the imperfect development of the oral parts, as also by the structure of the legs. Hesse records 2 species of this genus, *C. flavus* and *viridis*, none of which seems to be identical with the 2 Norwegian species here described.

25. *Cryptopodus brevicauda*, (Canu)

(Pl. XXXV)

Aplostoma brevicauda, Canu, Copépodes de Boulonnais, p. 223, Pl. XX, figs. 5—18.

Specific Characters.—*Female.* Body rather slender, with the anterior division nearly cylindrical in shape, though gradually narrowed in its anterior part; limits of the segments indicated by well-marked constrictions. Cephalic segment comparatively small and less distinctly defined, terminating in front in a minute tuberculiform prominence. Tail very short, scarcely exceeding in length $\frac{1}{6}$ of the anterior division, and only composed of 2 distinctly defined segments, the 1st rather broad at the base and rapidly tapered distally, the 2nd very small. Caudal rami somewhat divergent, each with a minute bristle in the middle of the outer edge and another still smaller one at the apex. Anterior antennæ conical in form and apparently composed of 4 joints, the outer 3 quite short and clothed with small bristles. Posterior antennæ much smaller than the anterior, with the distal joint narrow linear in form and armed outside with 4 minute denticles. Anterior lip with the hind edge quite smooth. Ovisacs fully as long as the entire body, cylindrical in form, and more or less twisted.

Body of the living animal rather opaque, of a pale rosy colour, with the ovarian tubes of a somewhat darker hue.

Length of adult female 2.50 mm.

Remarks.—The above-described form is unquestionably identical with that recorded by Canu as the type of his genus *Aplostoma*. Canu has also observed the male of this species, and has given good figures of it in the above-quoted work.

Occurrence.—Some few female specimens of this peculiar Copepod were taken, many years ago, at Espevær, west coast of Norway. They were found in the compound Ascidian, *Polyclinum luteum*, lying within a diverticle of the branchial sac of the Zooids.

Distribution.—Coast of France (Canu).

26. *Cryptopodus eruca*, (Norman).

(Pl. XXXV, 2)

Enterocola eruca, Norman, Last Shetland dredging Report, p. 300.

Specific Characters.—*Female.* Body resembling in shape that of the preceding species, but (in the specimens observed) more strongly curved and with the constrictions between the segments deeper. Tail comparatively still smaller than in *C. brevicauda*, with the caudal rami much shorter and without any bristles. Anterior antennæ apparently only composed of 3 joints. Posterior antennæ comparatively stouter than in that species, with the distal joint coarser and only armed with 3 short denticles outside. Anterior lip with the posterior edge divided into 6 very conspicuous tooth-like processes, 2 mediate and 2 on each side near the outer corner. The other appendages scarcely differing in structure from those in *C. brevicauda*. Ovisacs of quite an extraordinary length, being more than 3 times as long as the body, and of narrow cylindrical form.

Colour of the living animal not yet ascertained.

Length of adult female 2.30 mm.

Remarks.—My identification of the above-described form with Norman's *Enterocola eruca* is only based on its occurrence in the same host. For the remarks given by Norman are much too scanty for allowing any more exact comparison. It is undoubtedly congeneric with Canu's species, but differs conspicuously in the structure of the anterior lip, and more particularly in the enormous development of the ovisacs.

Occurrence.—Two female specimens, the one ovigerous, of this form were taken, many years ago, from as many specimens of *Styela intestinalis* collected in the upper part of the Christiania Fjord. Norman also obtained his specimen from the same Ascidian.

Distribution.—Shetland Isles (Norman).

Gen. 16. *Enterocola*, v. Benden 1860.

Generic Characters.—Body (of female) more or less slender, with the anterior division well marked off from the posterior and divided by slight constrictions into the normal number of segments. Tail more perfectly segmented than in *Cryptopodus*. Anterior antennæ very small. Posterior antennæ much larger, with the terminal joint lamellar and fringed at the end with spines or setæ. Anterior lip rounded. Maxillæ and maxillipeds rather

coarsely built, the former terminating in a stout conical process turned obliquely inwards, and having outside a scale-like palp edged with coarse spines; the latter imperfectly prehensile, with the distal joint produced at the end into 2 coarse spines. The 4 anterior pairs of legs more perfectly developed than in *Cryptopodus*, the basal part being well defined and biarticulate; rami comparatively small, uniarticulate, the outer one simple mucroniform, the inner lamelliform and provided at the end with 2 setæ; between each pair of these legs a thin connecting plate present, of different form in the different species. Last pair of legs transformed to 2 rather large curved lamellæ projecting on each side from the hind end of the trunk, and separated dorsally by a narrow cleft. Ovisacs less produced than in the preceding genus.

Remarks.—This genus was established as early as the year 1860 by v. Beneden, and ought of course to be considered as the type of the present family. It differs conspicuously from the preceding genus, especially as regards the structure of the posterior antennæ and the oral parts. Moreover the legs are built on a somewhat different type, and the transformed last pair bear an evident resemblance to those in some of the *Botryllophilidæ* (*Pteropygus*, *Schizoproctus*). A quite peculiar character of this genus is also found in the presence of a well-marked connecting plate between each pair of the 4 anterior pairs of legs. Two species of the present genus have been formerly recorded, viz., *E. fulgens* v. Beneden and *E. Betencourti* Canu. The Norwegian form described below cannot be referred to any of these 2 species.

27. *Enterocola bilamellata*, G. O. Sars, n. sp.

(Pl. XXXVI, 1)

Specific Characters.—*Female.* Body comparatively slender, with the anterior division almost perfectly cylindrical in shape, being scarcely at all narrowed in front. Cephalic segment nearly as large as the succeeding segment, and terminating in a blunt rostral prominence. Tail nearly attaining in length $\frac{1}{3}$ of the anterior division and rather swollen at the base, being composed of 4 well defined segments gradually narrowed behind. Caudal rami about the length of the last 2 segments combined and rather narrow, without any armature whatever. Anterior antennæ comparatively small, conical in form, and apparently composed of 4 joints, the 1st much the largest, the last very small, tuberculiform, without any bristles. Posterior antennæ with the distal joint remarkably large, forming a recurved oblong or linguiform plate divided at the end into 7 thin setiform appendages of unequal length. Maxilles with a

small bispinose lappet inside turning towards the mouth, terminal prominence very coarse, resembling somewhat in shape the molar process of the mandibles in higher Crustacea; palpe sub-spatulate in form, and armed on the broadly rounded terminal edge with 5 coarse spines of equal size. Maxillipeds short and stout, with a small conical process inside the large proximal joint; distal joint strongly chitinised, incurved, and projecting at the end into 2 coarse and somewhat unequal spiniform processes. The 4 anterior pairs of legs of essentially same structure, 2nd basal joint well defined from the 1st and projecting outside in a small, knob-like prominence; inner ramus oval in form, with the 2 apical setæ rather slender and considerably exceeding the ramus in length; connecting plate between these legs divided by a deep incisure into 2 rather prominent linguiform lamellæ. Last pair of legs obliquely oval in form and slightly upturned, advancing on each side somewhat over the base of the tail, each having on the posterior edge 2 small bristles. Ovisacs not present in the specimen examined.

Colour of the living animal not yet ascertained.

Length of the body 2.60 mm.

Male unknown.

Remarks.—The above-described form is unquestionably referable to the genus *Enterocola* of v. Beneden, but differs from the 2 other known species by the comparatively narrow cylindrical form of the anterior division of the body, as also in the structure of the posterior antennæ and oral parts. Another character by which this form is easily recognised is the peculiar bilamellar shape of the connecting plates between the 4 anterior pairs of legs. The specific name here proposed alludes to this character.

Occurrence.—A solitary specimen only of this form, an apparently fully grown female, but without ovisacs, has as yet come under my notice. It was found in a bottom-sample taken at Farsund, south coast of Norway, from a depth of about 40 fathoms, and had undoubtedly by some accident been thrown out from its abode within some compound Ascidian.

Gen. 17. *Mycophilus*, Hesse, 1865.

Generic Characters.—Body of female soft, vermiform, and more or less strongly curved dorsally, with no sharp demarcation between the anterior and posterior divisions. Trunkal segments indicated by slight constrictions of the body. Tail however not at all segmented, sac-like, with 2 very small lamellæ (the caudal rami) on the blunted extremity. Anal orifice not, as usual,

occurring at the end of the tail between these lamellæ, but transferred far in front on the dorsal face of the body, on which account the posterior part of the intestinal canal forms a peculiar coil within the caudal part. Antennæ and oral parts very imperfectly developed and densely crowded. Only 4 pairs of rudimentary legs present, the 5th pair being wholly absent. Ovisacs not yet observed.

Remarks.—This is one of the many genera established by Hesse for the peculiar parasites obtained by him from compound Ascidians. Indeed some of the characters distinguishing the present genus are so strange, that it could seem somewhat questionable if it might be included in the same family with the 2 preceding genera. Yet, some points of agreement are found to exist with the genus *Enteropsis* of Aurivillius, which is regarded as a true Enterocolid. The genus as yet only comprises a single species, to be described below.

28. *Mychophilus roseus*, Hesse.

(Pl. XXXVI, 2)

Mychophilus roseus, Hesse, Recherches sur les Crustacés rares ou nouveaux des côtes de France. Ann. d. sci. nat. Zoologie, Ser. 5, Vol. IV.

Syn: *Enteropsis wararensis*, Scott.

Specific Characters.—*Female.* Body slender, cylindrical in form, though having its posterior part always strongly curved dorsally. Cephalic segment comparatively small and somewhat contracted in front, terminating in a very minute knob-like rostral prominence. Trunkal segments only faintly marked, the last one confluent with the tail. Caudal part of body nearly occupying half the entire length, and scarcely at all narrower than the anterior division, its extremity bluntly rounded and carrying 2 very small blade-like caudal rami. Anal orifice occurring nearly in the middle of the dorsal face of the body, and defined by 2 distinctly projecting lips. Posterior part of the intestine rather narrow and forming a more or less deep coil within the tail, ascending along its dorsal face to the anal orifice. Anterior antennæ very small, and apparently only composed of 2 joints. Posterior antennæ with the distal joint abruptly recurved and terminating in an acute point. Maxillæ of a somewhat similar shape, but provided with a small lateral appendage (palp). Maxillipeds poorly developed, imperfectly articulate, and terminating in a very small hook-like point. Legs of uniform appearance, forming simple conical prominences extending laterally and each terminating in 2 very minute chitinous pieces (rudiments of rami). Ovisacs not yet observed.

Colour of the living animal pale rosy.

Length of adult female 1.50 mm.

Male unknown.

Remarks.—The figure given by Hesse does not leave any doubt on the identity of the above-described form with that observed by him, and it is likewise quite certain that the form recorded by Scott under the name of *Enteropsis wararensis* is the same species. Its very peculiar outward appearance renders it indeed easily recognisable from any other members of the present family.

Occurrence.—Some female specimens of this peculiar Copepod were obtained, many years ago, at Espevær, west coast of Norway. They were found in a species of *Botryllus*, taken up from a depth of about 20 fathoms.

Distribution.—Coast of France (Hesse), Scottish coast (Scott).

Supplement.

Gen. *Buprorus*, Thorell.

(See p. 61)

Of this remarkable genus, hitherto only represented by a solitary species, *B. Lovéni* Thorell, I have recently had an opportunity of examining a well defined new species, to be described below.

29. *Buprorus Nordgaardi*, G. O. Sars, n. sp.

(Pl. XXXVII, 1.)

Specific Characters.—*Female.* Body exhibiting the short bag-like form characteristic of the genus, though having the cephalic part considerably more exerted, and the posterior part, limiting the incubatory cavity, greatly expanded and broadly rounded off behind. Dorsal face of trunk exhibiting throughout a dense clothing of small scale-like prickles. Anterior antennæ resembling in shape those in *B. Lovéni*, being however divided into 7 well defined joints clothed in front with rather strong and somewhat unequal curved setæ, the 3 outermost joints much smaller than the others. Posterior antenna with the terminal joint nearly as large as the middle one and armed on the transversely truncated extremity with a stout spine followed by 4 somewhat curved setæ.

Mandibles considerably stronger than in the type species, with the palp well defined, conical in form, and provided at the tip with 2 unequal setæ. Maxillæ and posterior maxillipeds nearly as in *B. Lovéni*. Anterior maxillipeds, however, somewhat different, being comparatively more powerfully developed, with only a single bispinose lobe inside, and the terminal part undivided, claw-like, carrying outside, about in the middle, a bundle of 3 curved setæ. Legs on the whole less robust than in the type species, with the rami narrower and the spines on both of them uniseriate and much more slender, nearly setiform, 2 of them attached outside the terminal joint of the outer ramus; 4th pair smaller than the preceding ones, and having the number of spines considerably reduced. Last pair of legs about as in *B. Lovéni*, but with the apical spines more slender.

Colour of the living animal not yet ascertained.

Length of adult female scarcely exceeding 0.70 mm.

Male unknown.

Remarks.—The above-described form is unquestionably referable to the genus *Buprurus* of Thorell, but differs from the type species decidedly both as regards the general shape of the body and in the structure of some of the appendages, as indicated in the above diagnosis. It is also of much inferior size.

Occurrence.—2 female specimens of this form, the one with the incubatory cavity filled with embryos in the last (Nauplian) stage, were found in a small compound Ascidian (*Amoroecium*) taken by Mr. O. Nordgaard in the Trondhjem Fjord and kindly sent to me for examination together with other kinds of Ascidians. The species is named in honour of that distinguished naturalist, who also otherwise has assisted me in my investigation of the Norwegian Copepoda.

Fam. Anomopsyllidæ.

Gen. *Anomopsyllus*, G. O. Sars, n.

Generic Characters.—Body (of female) divided into 3 sharply defined sections: head, trunk and tail. Head comparatively small, triangular in form. Trunk rather tumid and without any distinct segmentation. Tail comparatively short and much narrower than the trunk, terminating in 2 diverging caudal

rami provided with the usual number of setæ. Antennæ attached close together, the anterior ones slender, multiarticulate, the posterior ones much smaller and not prehensile. Oral parts imperfectly developed, except the posterior maxillipeds, which are of a very peculiar structure and apparently prehensile, terminating in a narrow and very mobile digit minutely clawed at the tip. Only 3 pairs of legs present, all very imperfectly developed, forming small and simple triangular lamellæ without any armature whatever. 2 ovisacs present in female attached to the sides of the genital segment.

Remarks.—It is very questionable, if this remarkable genus at all is referable to the *Notodelphyoida*, and it is only provisionally recorded here, as I am at present unable to determine with certainty its true systematic position. In any case it ought to be regarded as the type of a quite distinct family, *Anomopsyllidæ*. The genus is founded on a single species, to be described below.

30. *Anomopsyllus pranizoides*, G. O. Sars, n. sp.

(Pl. XXXVII, 2)

Specific Characters.—*Female.* Body moderately slender, exhibiting in its general outline a perplexing similarity to a *Praniza*. Head rather small and produced in front to a beak-like prominence, its lateral edges abruptly curved behind. Trunk oblong oval in form, somewhat narrower in front than behind, posterior extremity very slightly emarginated in the middle, with the lateral corners evenly rounded off. Tail scarcely exceeding in length $\frac{1}{5}$ of the trunk, and apparently only composed of 3 segments, the 1st, or genital one, being rather tumid at the base; anal segment larger than the middle one and not dilated distally. Caudal rami narrow, sublinear in form, and considerably diverging, being about as long as the anal segment, each carrying at the tip 4 setæ, the 2 middle ones rather slender and abruptly bent outwards, the other 2 very small; seta of outer edge attached about in the middle. Anterior antennæ comparatively slender and attenuated, fully attaining the length of the head, and composed of 7 joints clothed with a few slender setæ. Posterior antennæ scarcely exceeding in length $\frac{1}{3}$ of the anterior, and composed of 3 nearly equal-sized joints, the last one tipped with a number of somewhat unequal setæ. Oral area exhibiting in the middle a rather wide hollowed space limited in front by a slightly curved projecting border, probably answering the anterior lip, and behind by a narrow oblong triangular plate (metastome). Mandibles and maxillæ undistinguishable, being replaced by an irregularly twisted chitinous frame limiting the above-mentioned hollowed space on each

side and sending off inwards 2 short prominences. Anterior maxillipeds very little prominent, and of a somewhat pyriform shape, converging anteriorly, and each terminating in a knob-like point closely applied to the anterior extremity of the metastomal plate. Posterior maxillipeds freely projecting and rather fully developed, but very unlike in structure those in other Copepoda, being doubly geniculate and composed of 4 joints, the 2nd of which is very large and lamellarly expanded inside; last 2 joints much narrower and forming together a slender very mobile digit, which is allowed to impinge against the inner sharpened edge of the preceding joint; proximal joint of this digit unarmed, distal joint somewhat attenuated and armed at the tip with 2 very small claws and, at some distance from the extremity, with another somewhat stronger claw. Legs with a slight indication to a division in a basal and terminal part, the latter exerted to an obtuse point without any traces of spines or setæ; 1st pair somewhat larger than the other 2, which successively diminish in size. Ovarial tubes in the specimen examined very conspicuous, extending throughout the greater part of the trunk, 2 tubes present on each side connected behind by a narrow commissure. Ovisacs broken off in the specimen examined, though indicated by a trifling piece of their coating still adhering to each side of the genital segment.

Colour of the living animal not yet ascertained.

Length of the specimen examined about 3 mm.

Male unknown.

Remarks.—The above-described form may be at once recognised from any of the hitherto known Copepoda. Indeed, the curious similarity it exhibits in the general outline of the body with a *Praniza* is very striking, and has given rise to the specific name here proposed. On the parasitic nature of this Copepod, no doubt can arise.

Occurrence.—A solitary specimen of this remarkable Copepod was found, detached from its host, in a bottom-sample taken in the upper part of the Christiania Fjord. In the same sample several other invertebrate animals were contained, among them also some Annelids, and it seems to me not improbable, that the present Copepod had originally been attached to one of these Annelids.

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¹⁾ I have not had an opportunity of consulting these papers.

SYSTEMATIC LIST

OF THE SPECIES DESCRIBED IN THE PRESENT VOLUME.

Monstrilloida.

Monstrilloida cyclopimorpha. Thaumatopsyllidæ.

Thaumatopsyllus, G. O. Sars.
paradoxus, G. O. Sars.

Monstrilloida genuina. Monstrillidæ.

Monstrilla, Dana.
longicornis, Thompson.
longiremis, Giesbrecht.
clavata, G. O. Sars.
leucopis, G. O. Sars.
gracilicauda, Giesbrecht.
helgolandica, Claus.
serricornis, G. O. Sars.

Cymbasoma, Thompson.
rigidum, Thompson.
Thompsoni, Giesbrecht,
longispinosum, Bourne.

Monstrillopsis, G. O. Sars.
dubia, Scott.

Notodelphyoida.

Notodelphyidæ.

Notodelphys, Allman.
Allmani, Thorell.
rufescens, Thorell.
caerulea, Thorell.
agilis, Thorell.
tenera, Thorell.
elegans, Thorell.
prasina, Thorell.

Agnathaner, Canu.
typicus, Canu.

Doropygidæ.

Doropygus, Thorell.
pulex, Thorell.
psyllus, Thorell.
porcicauda, Brady.
Doropygopsis, G. O. Sars.
longicauda, Aurivillius.
Doropygella, G. O. Sars.
Thorelli, Aurivillius.

Pachypygus, G. O. Sars.

gibber, Thorell.

Notopterophorus, Costa.

auritus, Thorell.

papilio, Hesse.

micropterus, G. O. Sars.

Gunentophorus, Costa.

globularis, Costa.

Botachus, Thorell.

cylindratus, Thorell.

Buproridæ.

Buprorus, Thorell.

Lovèni, Thorell.

Nordgaardii, G. O. Sars.

Ascidicolidæ.

Ascidicola, Thorell.

rosea, Thorell.

Botryllophilidæ.

Botryllophilus, Hesse.

brevipes, G. O. Sars.

Pteropygus, G. O. Sars.

vestitus, G. O. Sars.

Schizoproctus, Aurivillius.

inflatus, Aurivillius.

Enterocolidæ.

Cryptopodus, Hesse.

brevicauda, Canu.

eruca, Norman.

Enterocola, v. Beneden.

bilamellata, G. O. Sars.

Mycophilus, Hesse.

roseus, Hesse

Anomopsyllidæ.

Anomopsyllus, G. O. Sars.

pranizoides, G. O. Sars.

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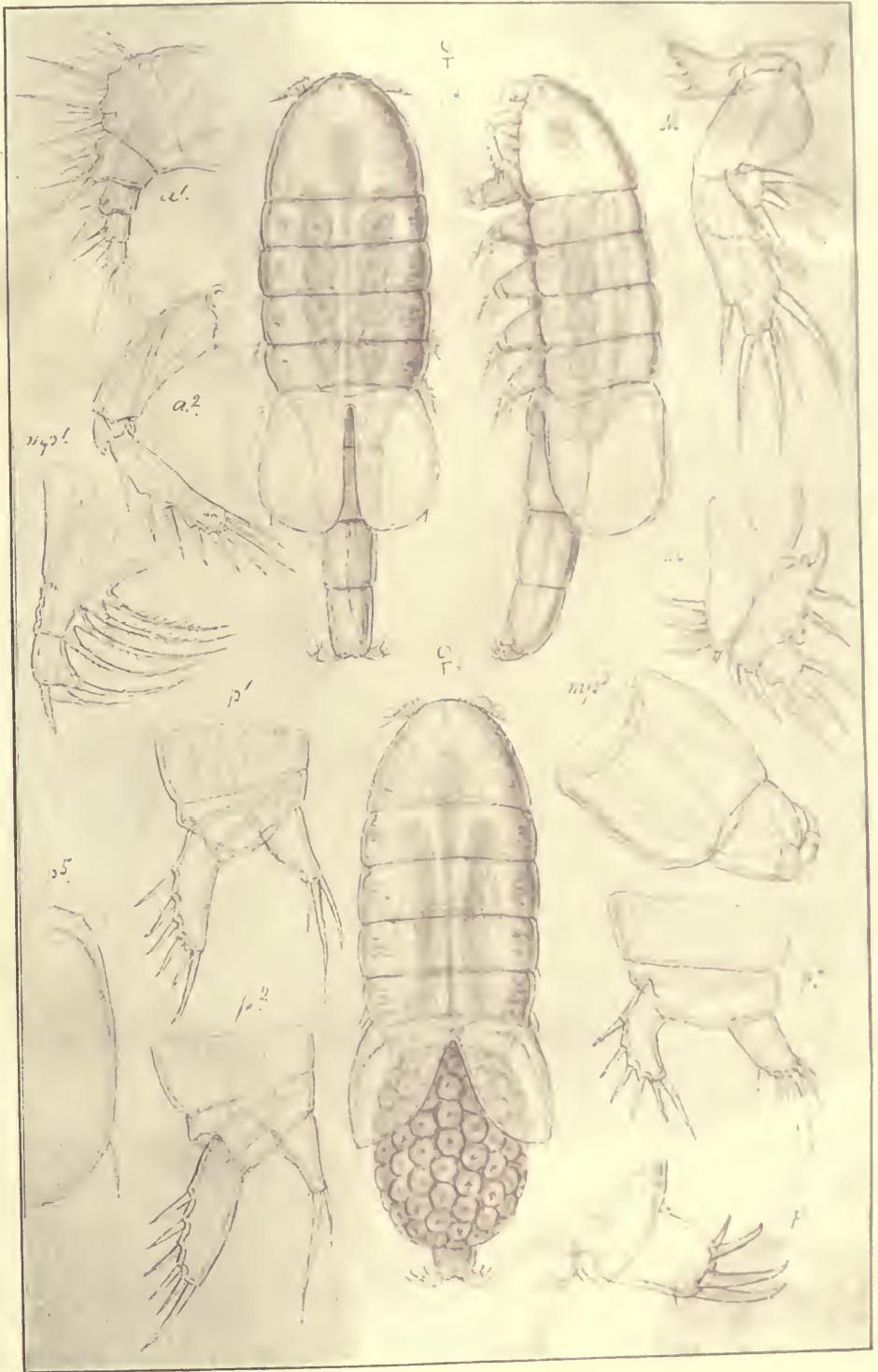
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Copepoda

Botryllophilidæ

Notodelphyoida

Pl. XXXIII



G. O. Sars del.

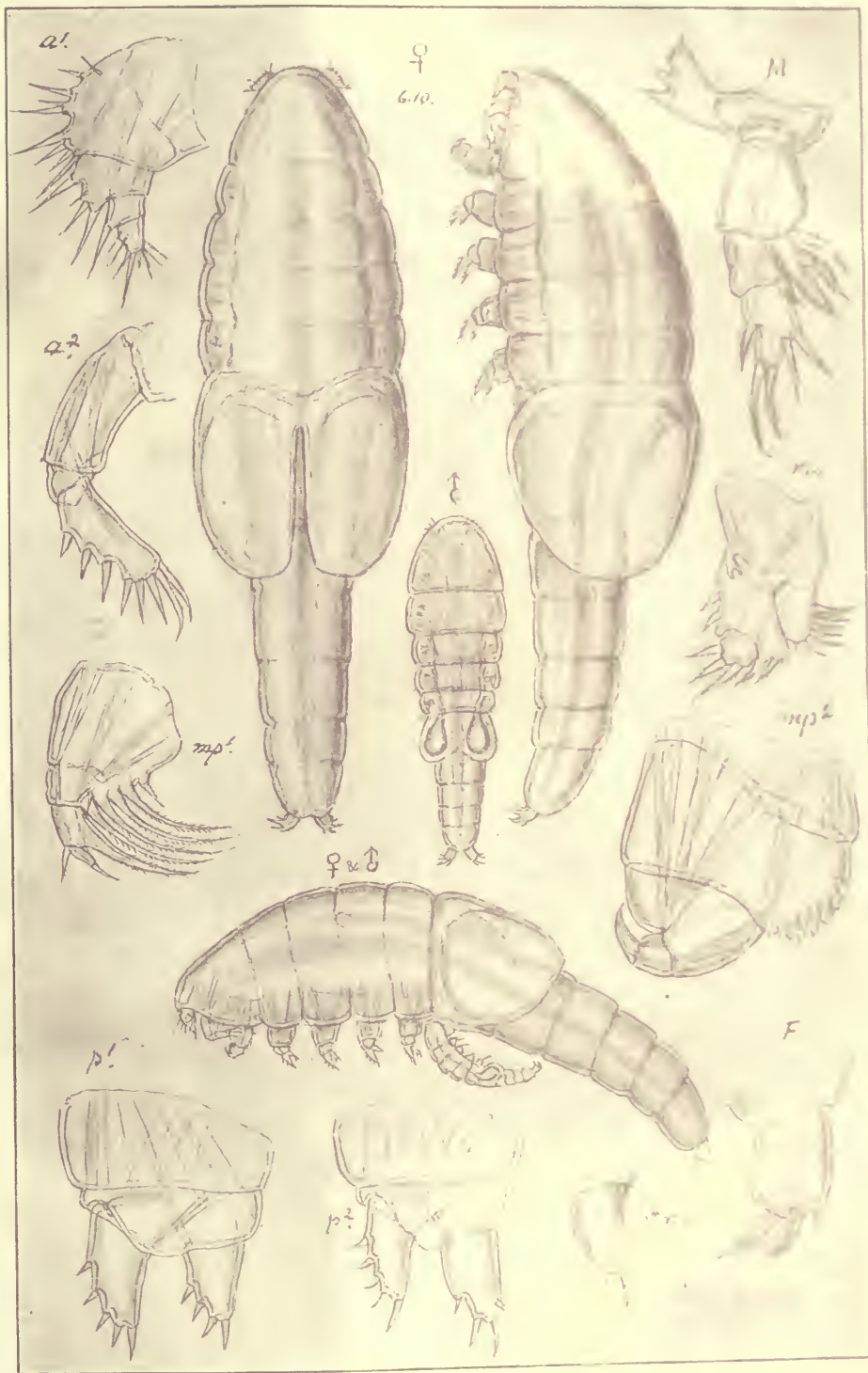
Pteropygus vestitus, G. O. Sars

Copepoda

Botryllophilidæ

Notodelphyoida

Pl. XXXIV



G. O. Sars del.

Schizoproctus inflatus, Auriv.

Copepoda

Notodelphyoida

Enterocolidæ

Pl. XXXV



G. O. Sars del.

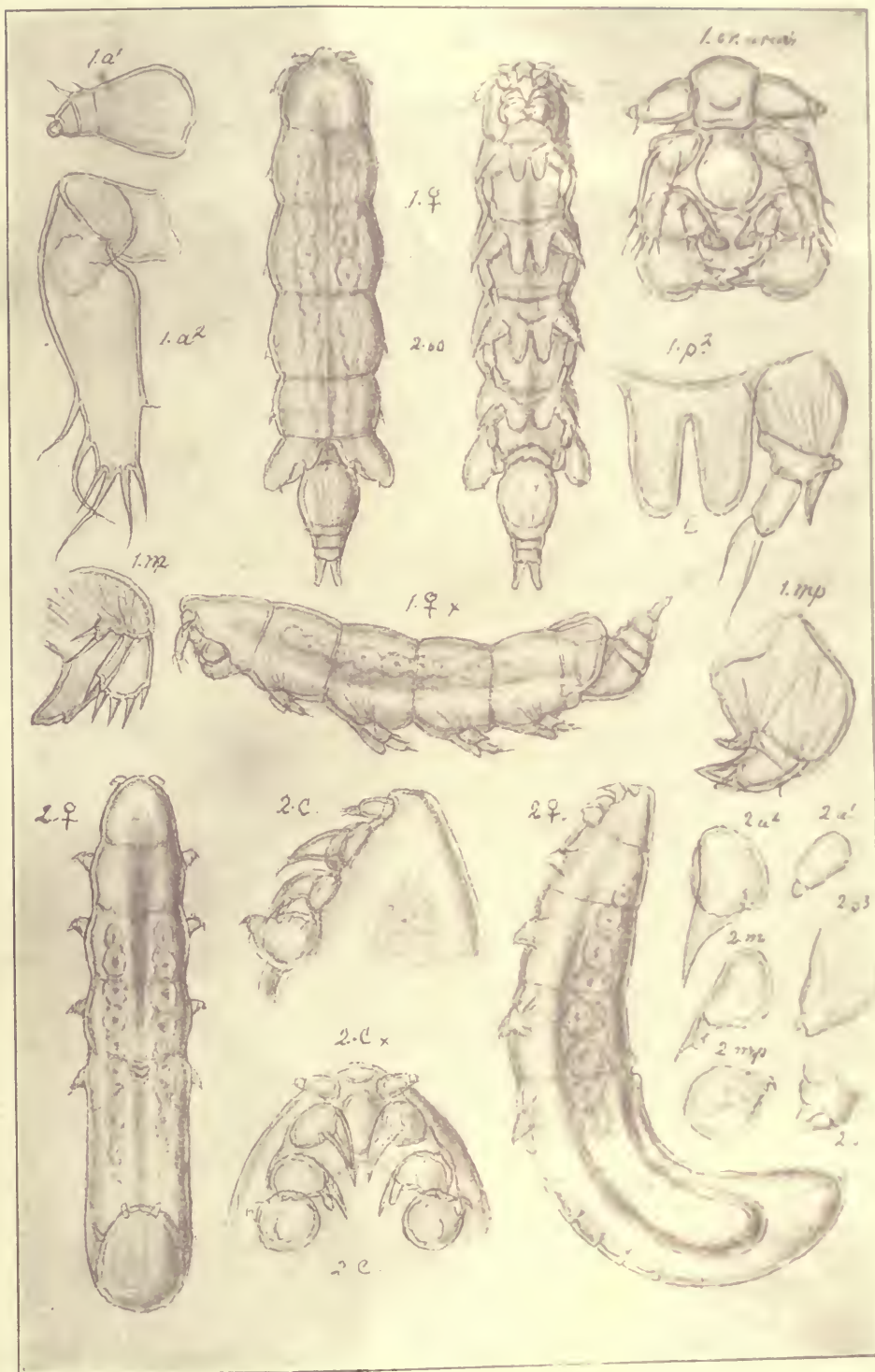
1. *Cryptopodus brevicauda* (Canu)
2. " *eruca* (Norman)

Copepoda

Enterocolidæ

Notodelphyoida

Pl. XXXVI



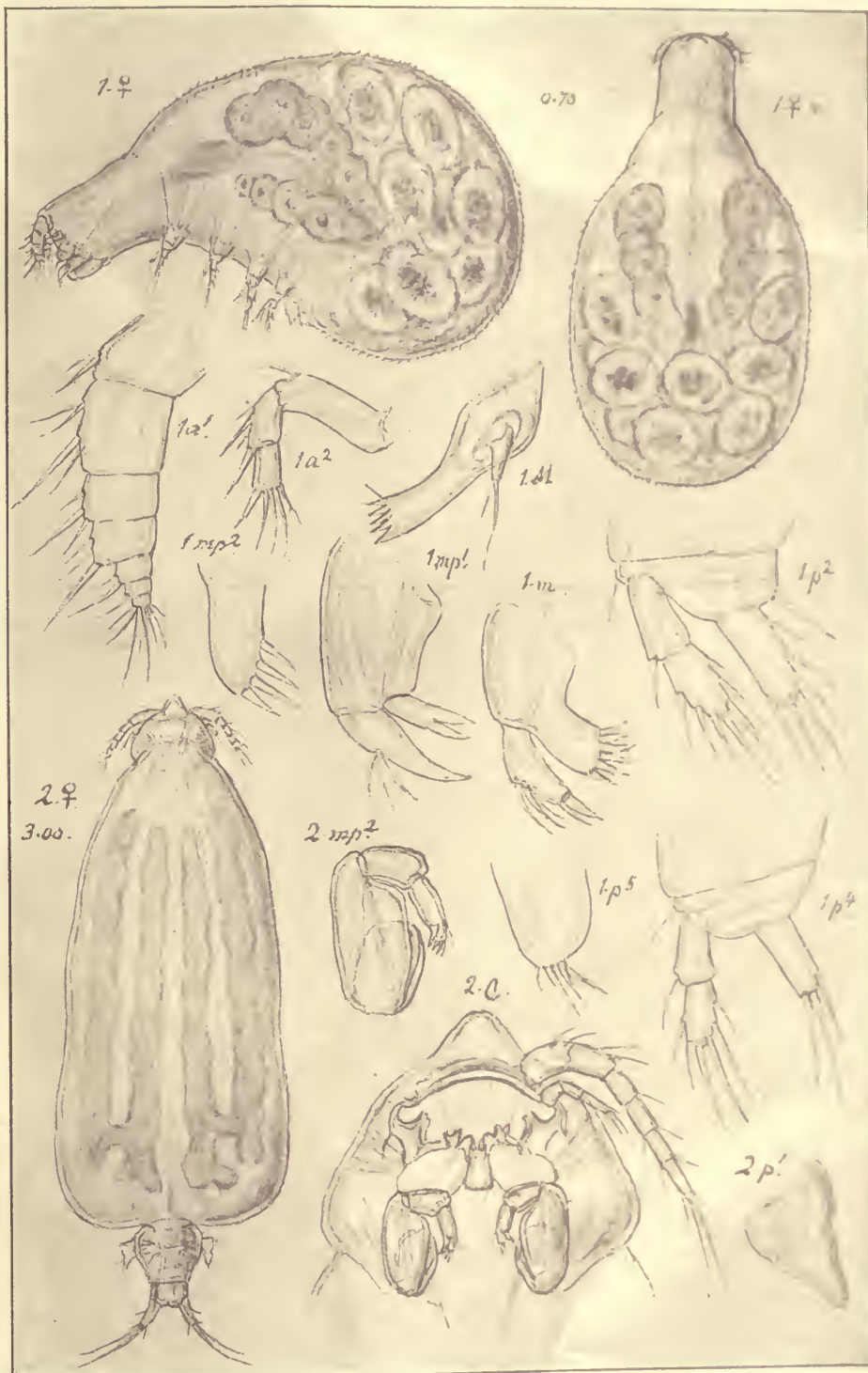
G. O. Sars del.

1. *Enterocola bilamellata*, G. O. Sars
2. *Mychophilus roseus*, Hesse

Copepoda

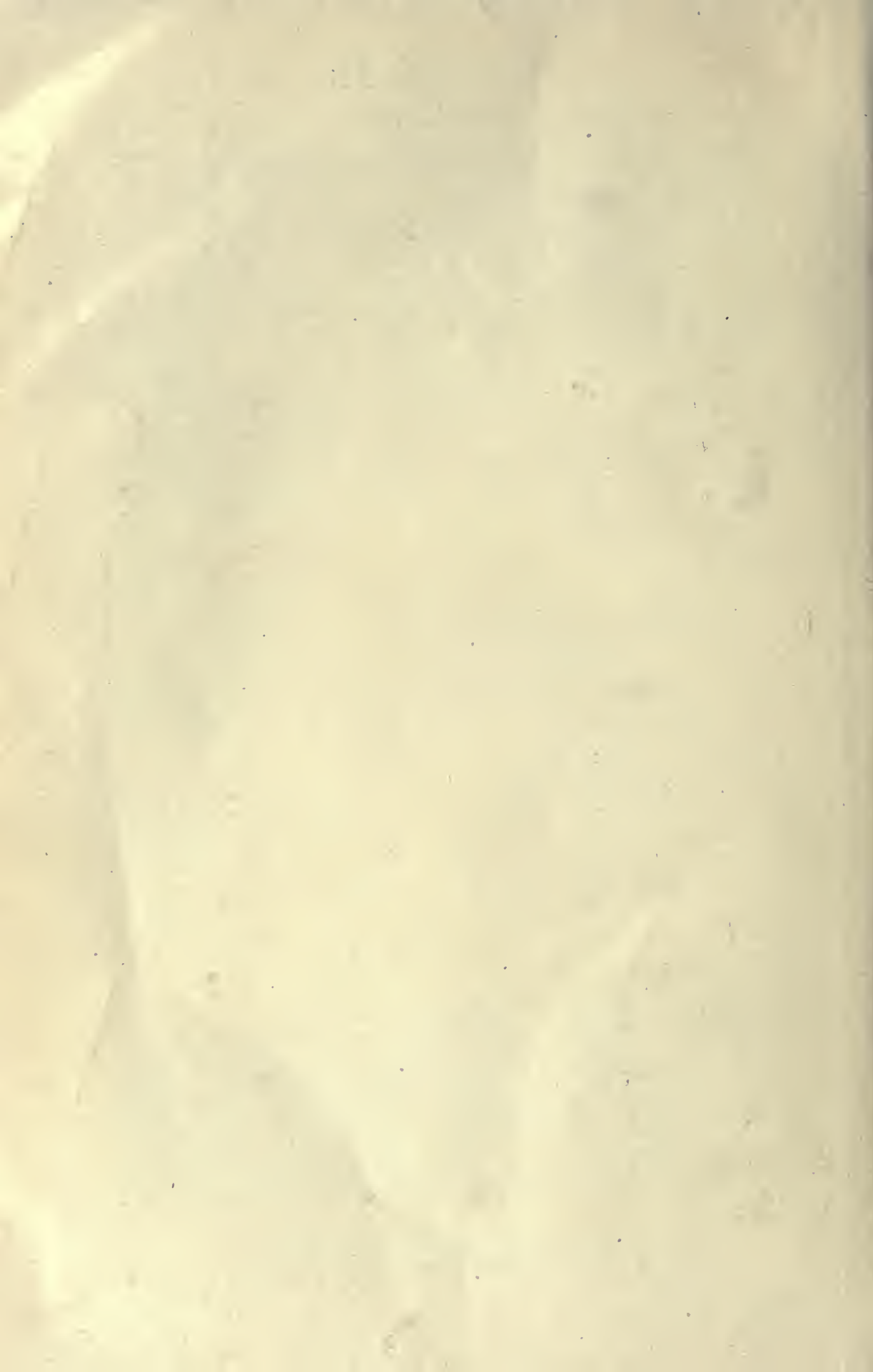
Buproridæ — Anomopsyllidæ Notodelphyoida

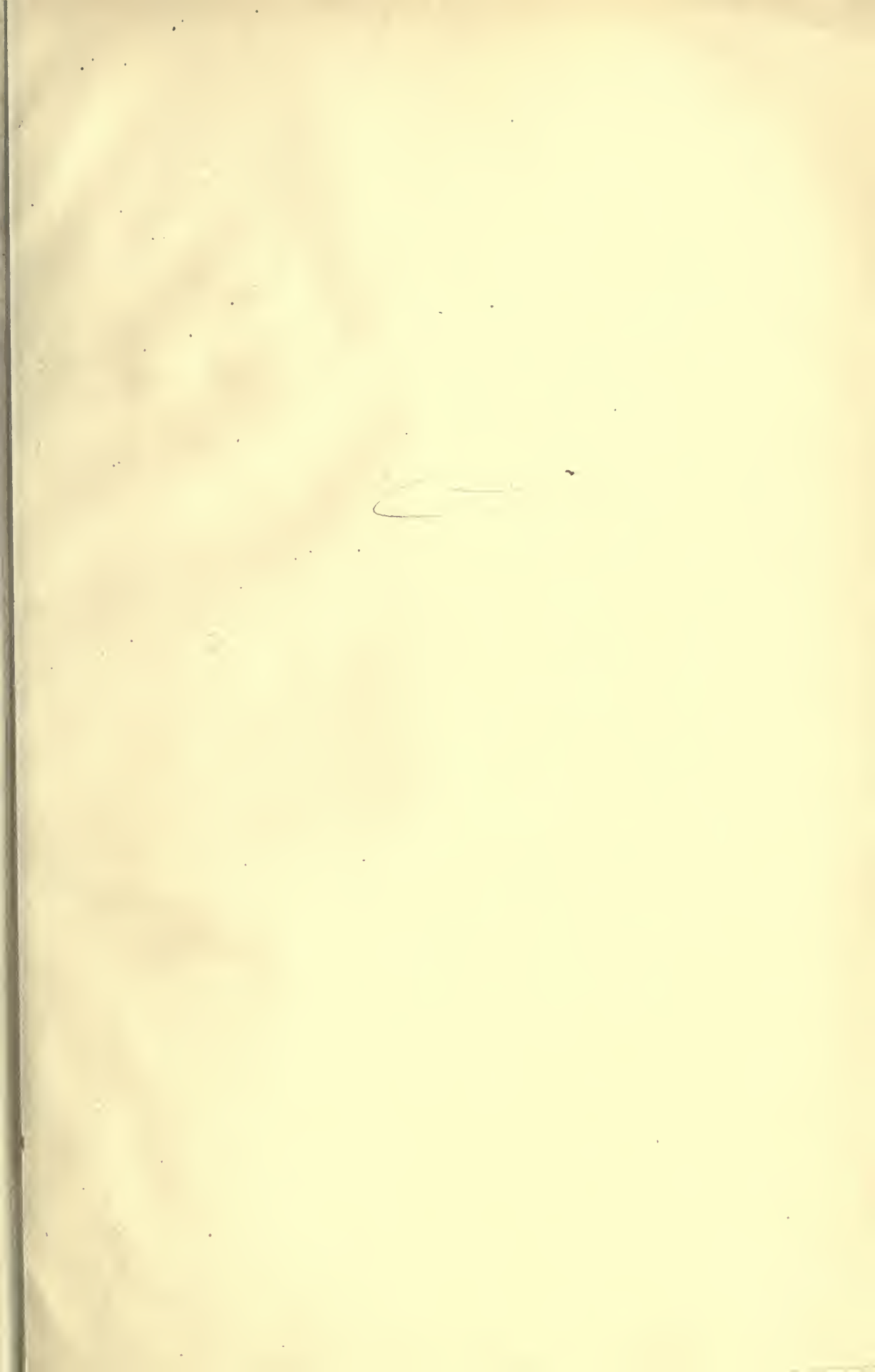
Pl. XXXVII



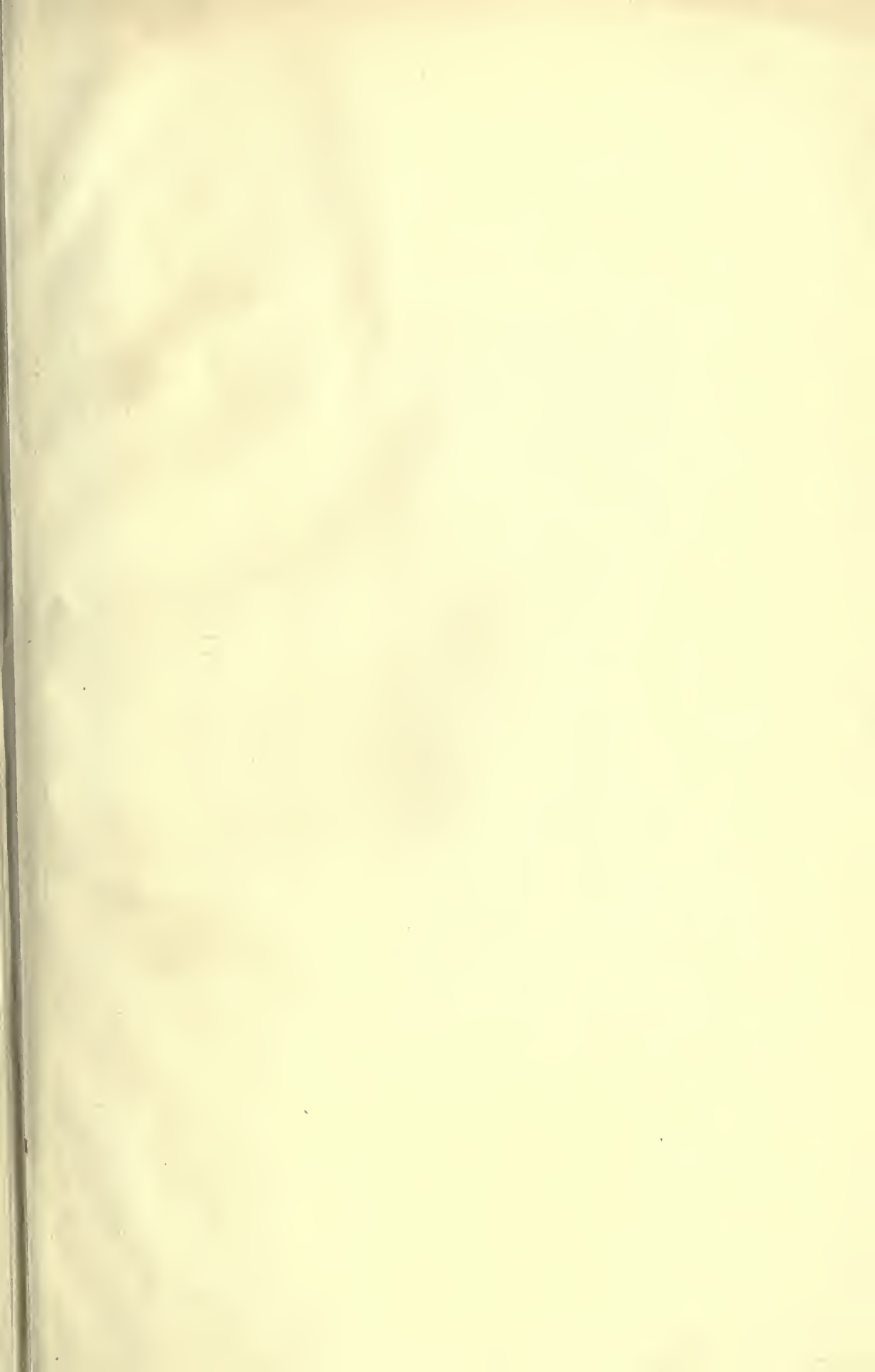
G. O. Sars del.

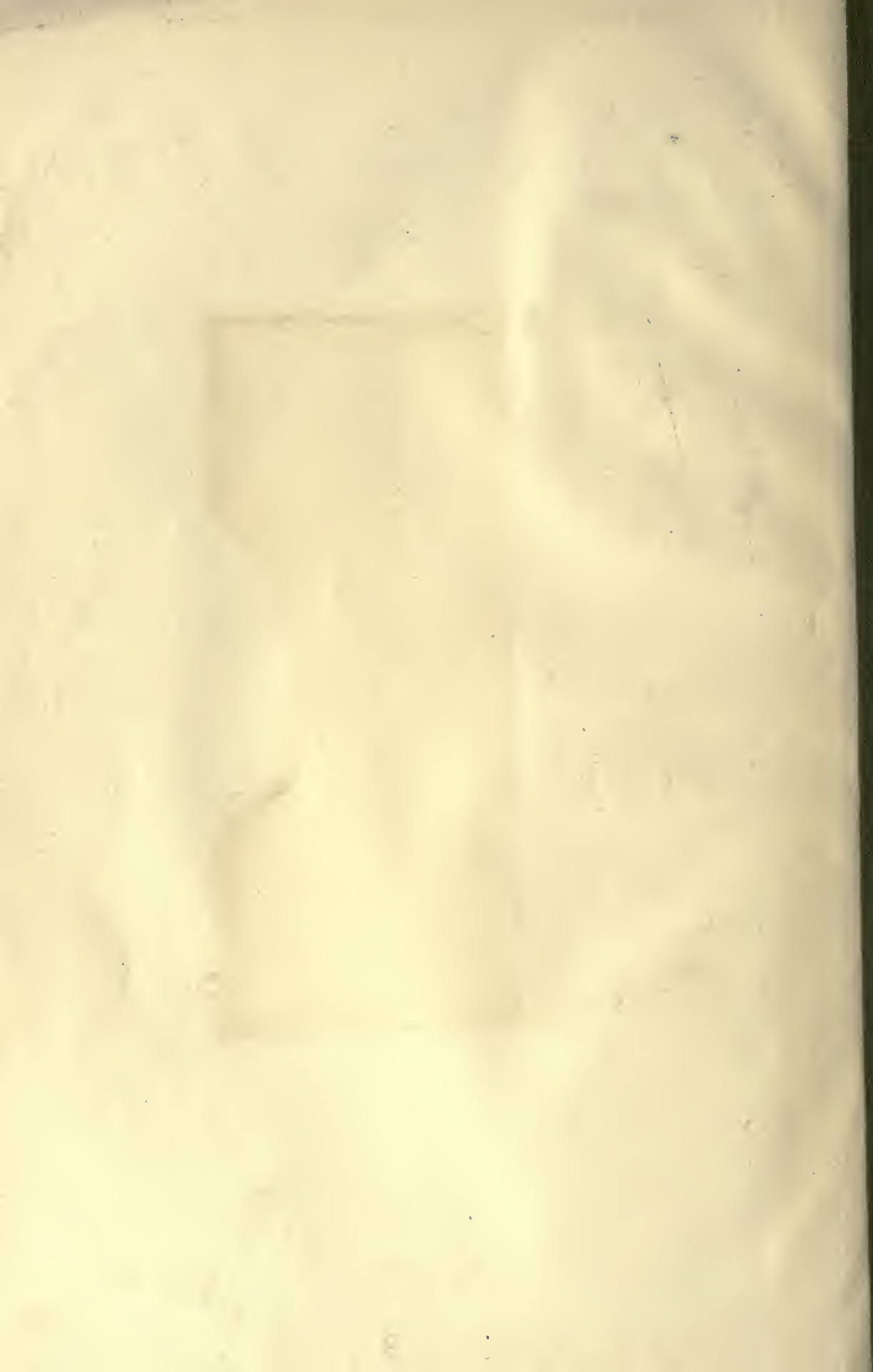
1. Buprorus Nordgaardi, G. O. Sars
2. Anomopsyllus pranizoides, G. O. Sars











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